THE WEATHER AND CIRCULATION OF FEBRUARY 1956[1]

Including a Discussion of Persistent Blocking and Severe Weather in Europe

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1. THE REVERSAL FROM EARLY WINTER

From December 1955 to January 1956 the large-scale circulation patterns over North America were remarkably persistent [1, 2]. In both months the controlling features were two deep troughs, one in the eastern Pacific, the other just off the Atlantic Coast. In February an abrupt reversal occurred as these troughs filled rapidly at middle and low latitudes, thus lengthening the wavelength and resulting in formation of a new trough in the central United States. The monthly mean 700-mb. chart (fig. 1) shows the first trough as only a relatively minor feature in the Gulf of Alaska, the second extending from middle latitudes of the western Atlantic into eastern Canada, and the new trough as a major feature from the Missouri Valley southwestward through Lower California.

The change in 700-mb. height anomalies associated with this transition in circulation pattern was very striking, as can be seen in figure 2 by noting the large areas of positive anomalous height change in the eastern Pacific and western Atlantic, separated by a band of negative change in the central United States. The magnitude of this circulation reversal is expressed statistically in table 1, which shows that the correlation coefficient between the height anomaly patterns in the area from 30° N. to 50° N. and 70° W. to 130° W. was negative from January to February, but positive from December to January.

Closely related to the circulation reversal was an abrupt change in weather from the regime of December and January to that of February. In the West mild, excessively rainy weather was replaced by cold, relatively dry weather; while the East experienced a change from cold, dry conditions to a mild and rainy regime. This can best be seen by comparing figures 3 and 4, which show the observed temperature and precipitation anomaly classes for the months of January and February 1956. In table 1 is given a summary of statistical measures of this reversal. From a count of 100 stations evenly distributed around the country it was found that 48 did not change by more than one class in temperature, while only 27 remained in the same precipitation class. These values

TABLE 1.—*Persistence measures of monthly mean anomalies in the United States during 1955–56 winter*

	Jan.-Feb.	Normal (1942–50)	Chance	Dec.-Jan.
700-mb. height (lag correlation)	−.52	.26	0	.42
Temperature (0 or 1 class change, percent)	48	71	59	82
Precipitation (0 class change, percent)	27	37	33	48

are appreciably less than expected by chance or the normal amount of persistence from January to February as found by Namias [3]. Especially striking is the contrast with the marked persistence from December to January as given in the last column of table 1 [1].

2. WEATHER AND CIRCULATION IN THE UNITED STATES

Temperatures in the western portion of the United States averaged below normal during February, with greatest departures in the eastern halves of Washington and Oregon (fig. 3A and Chart I-B). The source region for much of this cold air was Alaska and northwest Canada, where mean temperatures in the layer from the surface to 700 mb. averaged as low as 8° C. below normal for the month (fig. 5). This cold pool has been a persistent feature of this fall and winter; in fact, portions of Alaska have had below normal temperatures each month since February 1955. Stronger than normal northwesterly flow at 700 mb. between a deep subpolar Low and a strong mid-Pacific ridge (fig. 1), brought repeated outbreaks of this cold polar air into the West. Note the existence of northwesterly anomalous flow components in the lower troposphere from Alaska to Texas (figs. 1 and 6B) The coldest weather was observed during the first half of the month, occurring at a time when the mean ridge reached its strongest development off the Pacific Coast. During the period January 29-February 5, temperatures averaged 21° F. below normal in parts of eastern Washington, Oregon, and Idaho, and 18° F. below normal in western Texas [4].

The subnormal temperatures throughout the West produced few records. It was, however, the coldest February ever observed at Fresno, Calif., and the second

[1] See Charts I–XV following p. 85 for analyzed climatological data for the month.

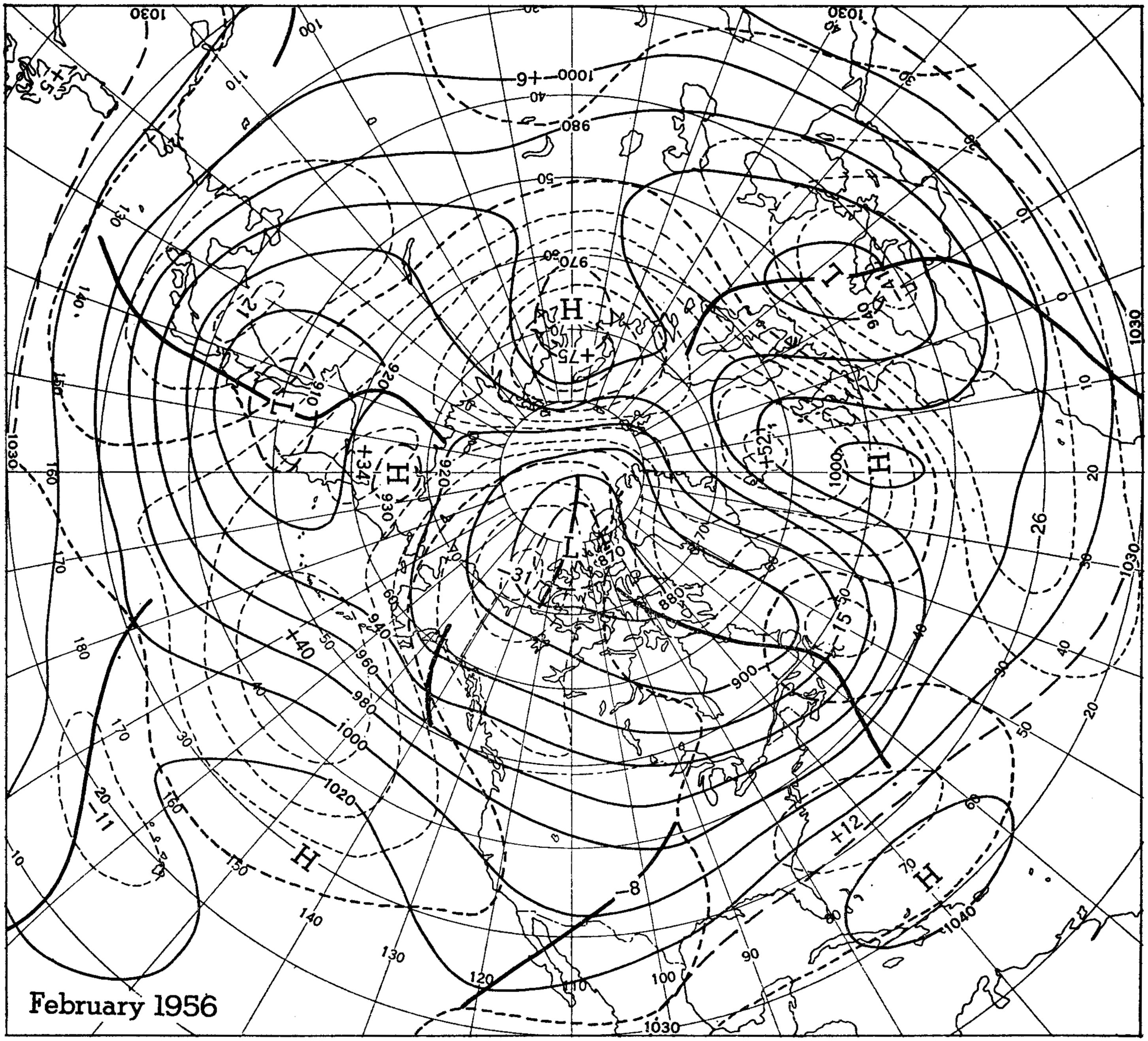

FIGURE 1.—Mean 700-mb. height contours (solid) and departures from normal (dashed) (both in tens of feet) for February 1956. Extensive bands of positive anomaly at higher latitudes and negative anomaly at lower latitudes were typical of a low index circulation pattern. Stong blocks were located in the North Atlantic and Eurasia.

coldest at Reno, Nev. New daily minimum temperature records were set during the month in parts of Oregon, Washington, and in eastern portions of the Dakotas and Colorado. At Yuma, Ariz., the monthly mean minimum temperature was the second lowest in 77 Februarys.

Mild weather with above normal temperatures prevailed in the eastern half of the United States (fig. 3A and Chart I-B) as a result of southwesterly flow at 700 mb. ahead of the trough in the central part of the country. Note especially the southerly anomalous flow at both 700 mb. (fig. 1) and sea level (fig. 6B). Greatest temperature departures were observed in the Southeast where the thickness anomaly (fig. 5) was also largest. Miami, Fla., had the warmest February day it has ever experienced with 85° F. on the 28th, while Augusta, Ga., reported a new high of 82° F. on the 19th.

The precipitation anomaly pattern in the West was rather chaotic, but in general subnormal amounts were observed (fig. 4A and Chart III). This resulted largely from lack of an adequate moisture source in northwesterly flow aloft to the rear of the mean trough in the central United States. In addition, the area from the

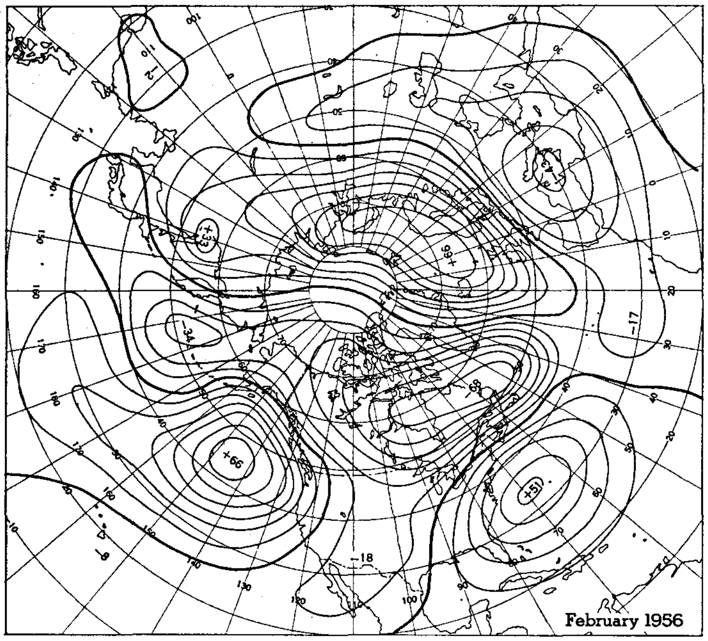

FIGURE 2.—Difference between monthly mean 700-mb. height anomaly for January and February 1956 (in tens of feet). Areas of large anomalous height change in North America and Eurasia were indicative of major changes in the mid-tropospheric circulation pattern.

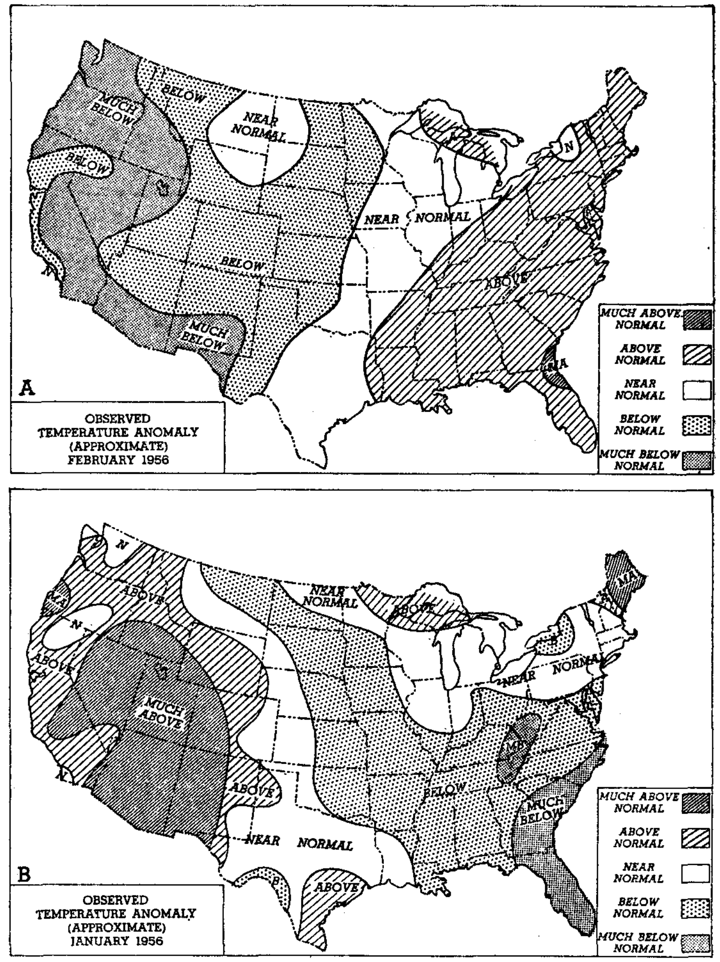

FIGURE 3.—Monthly mean surface temperature anomalies for (A) February 1956 and (B) January 1956. The classes above, below, and near normal occur on the average one-fourth of the time; much below and much above each normally occur one-eighth of the time.

Great Lakes westward lay between two primary storm tracks (fig. 6A). Very little precipitation fell in the Pacific Coast States during the first half of the month. The small amounts that did fall were mainly of a showery nature in cold unstable air masses, and were associated with trailing fronts from cyclones moving eastward along the primary storm track to the north (fig. 6A). Heavier amounts fell during the latter half of the month as a mean trough developed off the Pacific Coast and the westerlies increased in strength (fig. 7). Lack of precipitation and cloudiness resulted in considerably more sunshine than normal in the Great Basin and northern Rocky Mountain States (Chart VII). No measurable precipitation fell during the month at Las Vegas, Nev., the fourth such February in the last twenty.

Greater than normal amounts of precipitation in eastern Arizona, New Mexico, and the Texas Panhandle (Chart III and fig. 4A) were accompanied by a center of negative 700-mb. height anomaly in the mean trough (fig. 1). Most of this precipitation fell during a severe snowstorm from the 1st to the 5th, with as much as 15 inches in portions of southeastern New Mexico and the Texas Panhandle. Further details of this storm will be found elsewhere in this issue in an article by Brown and Brintzenhofe [5]. The total snowfall for the month (8.9 inches) at El Paso, Tex. was the greatest for any month of record.

From the Lower Mississippi Valley to New England precipitation was generally heavy (fig. 4A), with twice the normal amount falling in the Ohio Valley, Tennessee, and Arkansas (Chart III). Near record totals were observed in these areas, with Little Rock, Ark., and Huntington, W. Va., both reporting the second greatest February precipitation of record. These heavy amounts were related to southwesterly flow aloft east of the mean trough, and to southerly anomalous flow components advecting Gulf moisture northeastward. The primary storm track (fig. 6A) was close to the axis of heaviest precipitation and just to the north of the 700-mb. jet stream (fig. 8) in the area of maximum cyclonic shear.

What proved to be the worst storm of the month first entered the North Pacific States on the 22d. This storm system deepened rapidly as it swept eastward, bringing with it a variety of weather: a severe dust storm in the Southern Plains States, tornadoes and associated thunderstorms and hail in Missouri, Illinois, and Indiana, and freezing drizzle in Minnesota and Wisconsin. Winds of gale force and near record speeds in some areas accompanied the storm from the Rockies to the Atlantic Coast, with gusts reaching 88 m. p. h. at Amarillo, Tex., 84

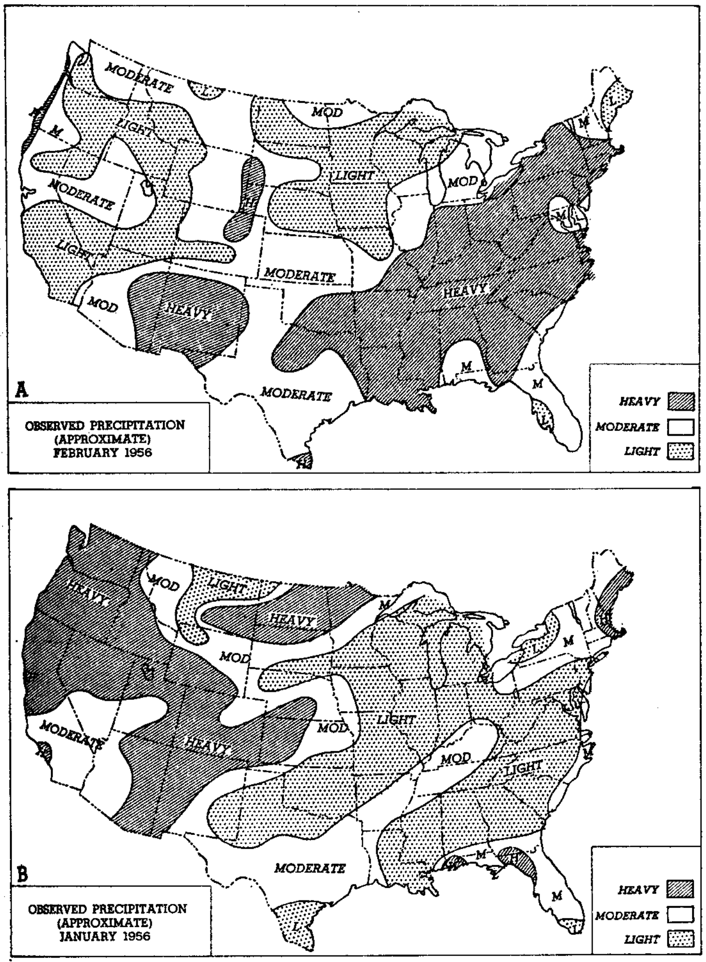

FIGURE 4.—Monthly precipitation anomalies for (A) February 1956 and (B) January 1956. The classes light, moderate, and heavy each normally occur one-third of the time.

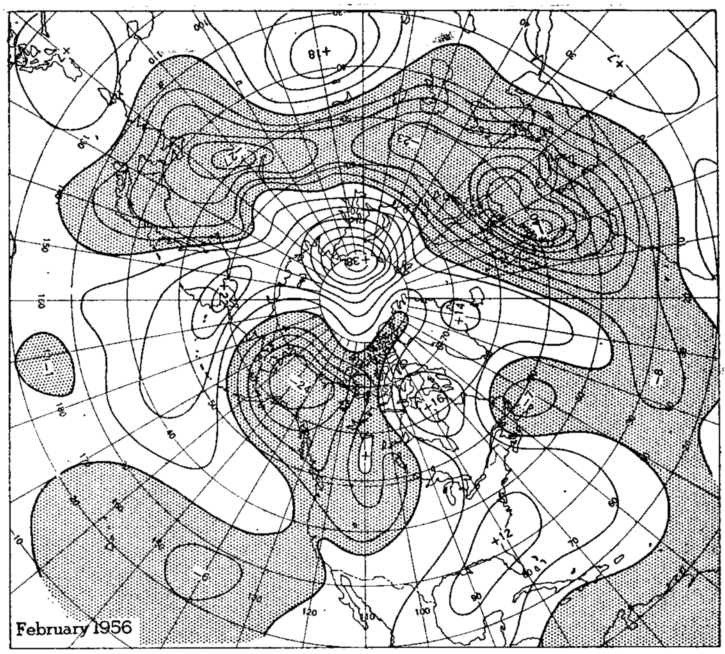

FIGURE 5.—Departure from normal of mean thickness (tens of feet) for the layer 700–1,000 mb. for February 1956 with subnormal values shaded. A thickness anomaly of −240 ft. corresponding to a mean virtual temperature anomaly of −8° C. was centered over Alaska, the source region for cold air invading the western United States. Note also the extreme cold over Europe.

m. p. h. at Akron, Ohio, and 87 m. p. h. at Allentown, Pa. A sea level pressure of 972 mb. at Buffalo, N. Y. on the 25th was the second lowest ever recorded at that station, while Rochester's minimum pressure was a record for any February.

3. INDEX TRENDS

The unusual behavior of the zonal index has been the subject of considerable discussion in the past few articles of this series [1, 2, 6, 7]. This index is a measure of the mean geostrophic west wind speed, expressed in meters per second, between latitudes 35° N. and 55° N. for the Western Hemisphere. Its monthly mean values at both 700 mb. and sea level, together with the corresponding anomalies, are shown in table 2 for the period from October 1955 to February 1956. For the month of February the index was 1.2 m. p. s. below normal at 700 mb., thus continuing the period of subnormal values observed since November 1955. Corresponding values at sea level have been below normal since October 1955. However, the February indices were considerably higher than those of the preceding month as strong blocking in Canada and the Bering Sea almost disappeared.

TABLE 2.—*Monthly zonal indices and departures from normal (m. p. s.). Negative indices represent net east-west flow*

	Western Hemisphere				Eastern Hemisphere			
	700 mb.	Anomaly	Sea level	Anomaly	700 mb.	Anomaly	Sea level	Anomaly
October	9.8	+0.3	3.3	−0.2	6.2	−0.2	−0.9	−1.1
November	8.9	−1.6	2.1	−2.0	8.2	+.4	.1	−.4
December	10.1	−1.2	2.9	−1.4	10.9	+2.9	1.8	+1.6
January	6.6	−5.2	0.0	−4.1	7.3	+.1	−1.1	−.8
February	9.0	−1.2	1.9	−1.5	5.3	−1.8	−4.1	−3.3

On a 5-day mean basis the zonal index rose rapidly after mid-month, reaching a value of 10.2 m. p. s. at 700 mb. for the period February 22–26, 1956. This was the first 5-day mean index above normal since October 22–26, 1955. The index continued to rise rapidly during the following week to a peak value of 14.4 m. p. s. (4.8 m. p. s. above normal) during the period February 29–March 4, 1956. The principal contribution to increasing westerlies at this time was relaxation of blocking in the North Atlantic. This is well illustrated by the 700-mb. chart for the period February 25–29 shown in figure 7.

The preceding has pertained to the Western Hemisphere index only. Similar values computed for the Eastern Hemisphere evidence quite a different trend. Table 2 shows that during November, December, and January subnormal values of the 700-mb. zonal index in the Western Hemisphere were accompanied by above normal values in the Eastern Hemisphere. Furthermore, from

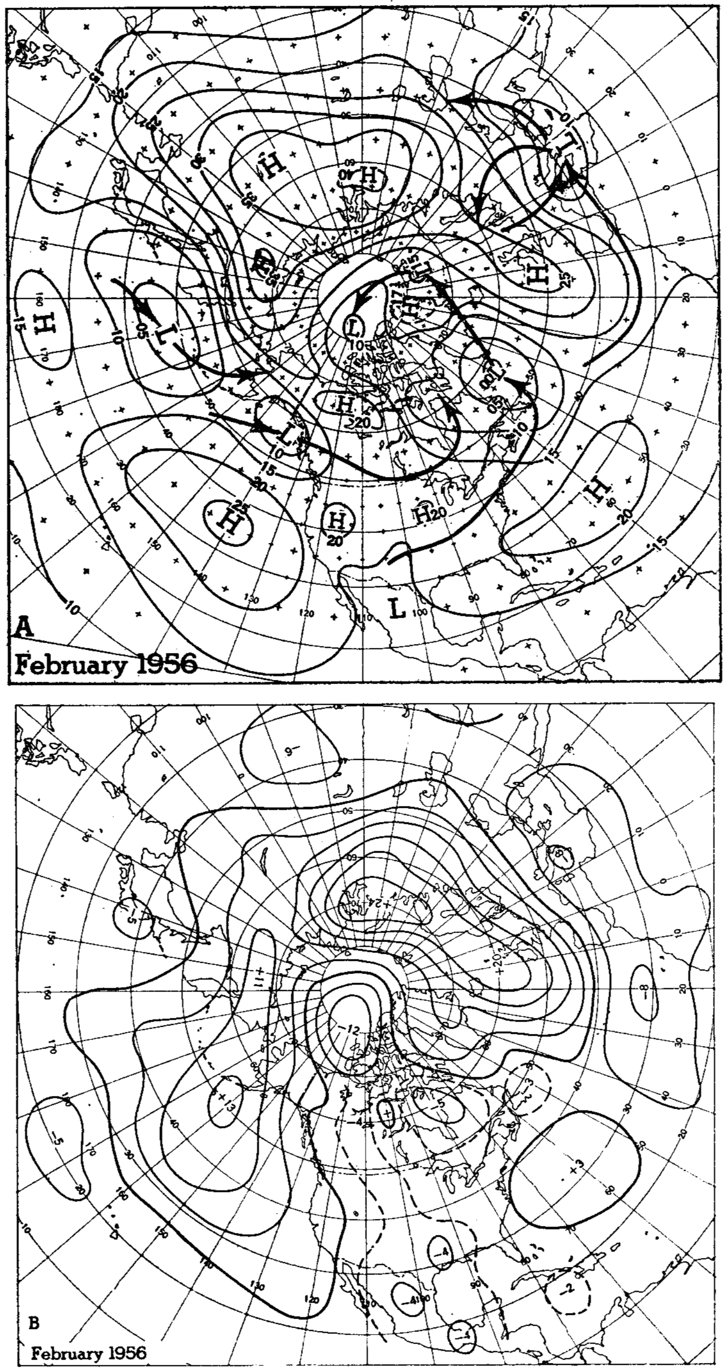

FIGURE 6.—(A) Mean sea level isobars and (B) departures from normal (both in millibars) for February 1956. Solid arrows in (A) indicate primary storm tracks as deduced from a plot of the daily Low positions.

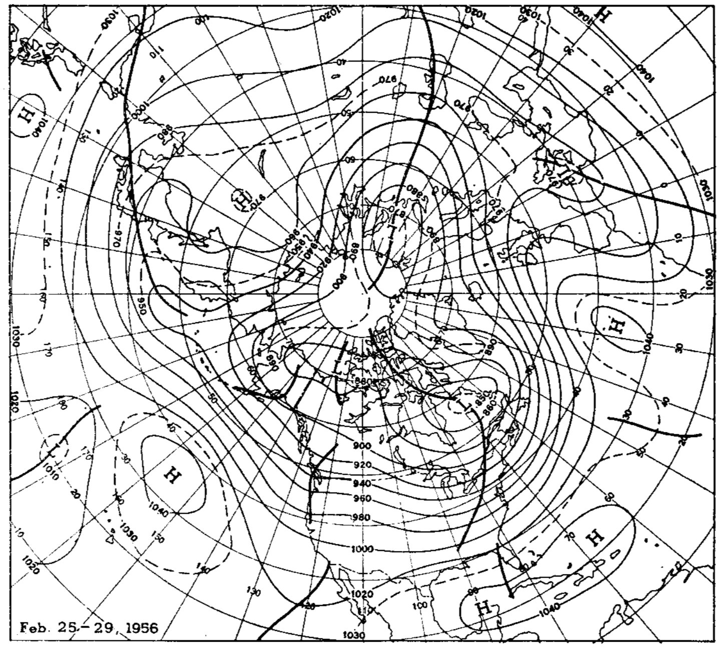

FIGURE 7.—Mean 700-mb. height (tens of feet) for the 5-day period of highest 700-mb. zonal index, February 25–29, 1956. Fast westerly flow prevailed at middle latitudes in most of the Northern Hemisphere.

January to February the index at both sea level and 700 mb. increased sharply in the Western Hemisphere, but declined abruptly in the Eastern Hemisphere. This was the culmination of a gradual change in the circulation of the Eastern Hemisphere from a high index, zonal-type pattern in December [2], to a meridional, low-index-type pattern during February. Both 700-mb. and sea level indices were far below normal in February, with a value of −4.1 m. p. s. at sea level indicating strong easterly flow. The change from January [1] was quite pronounced and can best be seen by reference to figure 2. Indicative of this change in pattern is the extensive area of positive anomalous height change from the North Atlantic across northern Eurasia, along with negative changes at lower latitudes. Thus, it would appear that regional considerations are necessary when one attempts to relate the circulation pattern to the hemispheric index, as recently emphasized by Klein [8].

4. ATLANTIC AND EURASIAN BLOCKING

One of the most pronounced and persistent blocking patterns ever to occur in the North Atlantic and Eurasian continent was observed during February 1956. The features commonly associated with blocking were all evident to a rather marked degree on the monthly circulation charts. For example, the jet stream at 700 mb. showed a pronounced split in mid-Atlantic, with one current flowing northward into polar regions, and the other southeastward across North Africa (fig. 8A). Both currents had wind speeds considerably above the normal (fig. 8B). At sea level the Siberian anticyclone was considerably stronger than normal and displaced to the northwest (fig. 6). Surface pressures were much above normal across all of northern Eurasia and the North Atlantic, with greatest departures near the two major blocking centers. Two primary storm tracks were observed, one following the jet stream north of the blocked area, the other paralleling the southern branch of the jet (figs. 6A and 8A). Those systems passing to the north were somewhat weaker than normal for February, while

Table 3.—*Maximum intensities of the Eurasian and Atlantic blocking centers at 700 mb. (in tens of feet) and sea level (in millibars) for the overlapping 5-day periods during existence of each block. Identification of a block determined by the presence of a closed anticyclone north of 45° N.*

Period	Eurasian center			Atlantic center		
	700 mb.		Sea level pressure	700 mb.		Sea level pressure
	Height	Anomaly		Height	Anomaly	
Jan. 28–Feb. 1	992	+850	1044			
Feb. 1–5	997	+970	1044	1,021	+300	1037
Feb. 4–8	1,010	+1150	1048	1,032	+710	1038
Feb. 8–12	1,026	+1300	1059	1,025	+920	1035
Feb. 11–15	1,029	+1300	1062	1,002	+680	1028
Feb. 15–19	1,056	+1470	1065	999	+500	1026
Feb. 18–22	1,015	+850	1049	1,013	+950	1033
Feb. 22–26				1,002	+630	1030

those storms following the southern track through the Mediterranean were deeper than normal, reaching their greatest intensity in the mean Low near Italy.

Three separate and distinct blocks appeared on the mean 700-mb. chart (fig. 1), all associated with closed, warm anticyclones. Note the extensive area of positive 700-mb. height anomaly extending almost completely around the Northern Hemisphere at higher latitudes, and the band of negative anomaly at lower latitudes from the Atlantic across Eurasia to the western Pacific. The weakest of these blocks was located in northeastern Siberia and was associated with a height anomaly of +340 ft., while the blocks in the North Atlantic and near Novaya Zemlya were associated with strong ridges and height anomalies of +520 ft. and +750 ft., respectively. The latter is the greatest positive 700-mb. height anomaly ever to occur in Eurasia on a monthly mean chart during our period of record (1948–56).

It is of interest to discuss the two major blocks on a 5-day mean basis. For this purpose blocking was defined as the presence of a closed anticyclone north of 45° N. In table 3 is given the maximum intensity of each blocking center at 700 mb. and sea level, along with the maximum 700-mb. height departure from normal, for the overlapping 5-day periods beginning with the inception of each block. The Eurasian block was the more stable of the two, moving very little while growing steadily to a maximum intensity of 10,560 ft. at 700 mb. and 1065 mb. at sea level, on February 15–19. The associated 700-mb. height anomaly, +1,470 ft., has been exceeded only once in the entire Northern Hemisphere during our period of record (1945–56). That occurred on February 19–23, 1947 when an anomaly of +1,600 ft. was observed in Baffin Bay during another period of pronounced blocking [9]. The intensity of the Atlantic block was more erratic in nature, passing through two cycles on a 5-day mean basis. It disappeared on February 26, while the Eurasian block existed until February 23. The duration of these blocks, 24 days and 27 days, respectively, is considerably longer than the average duration of 16 days for a winter block as noted by Rex [10].

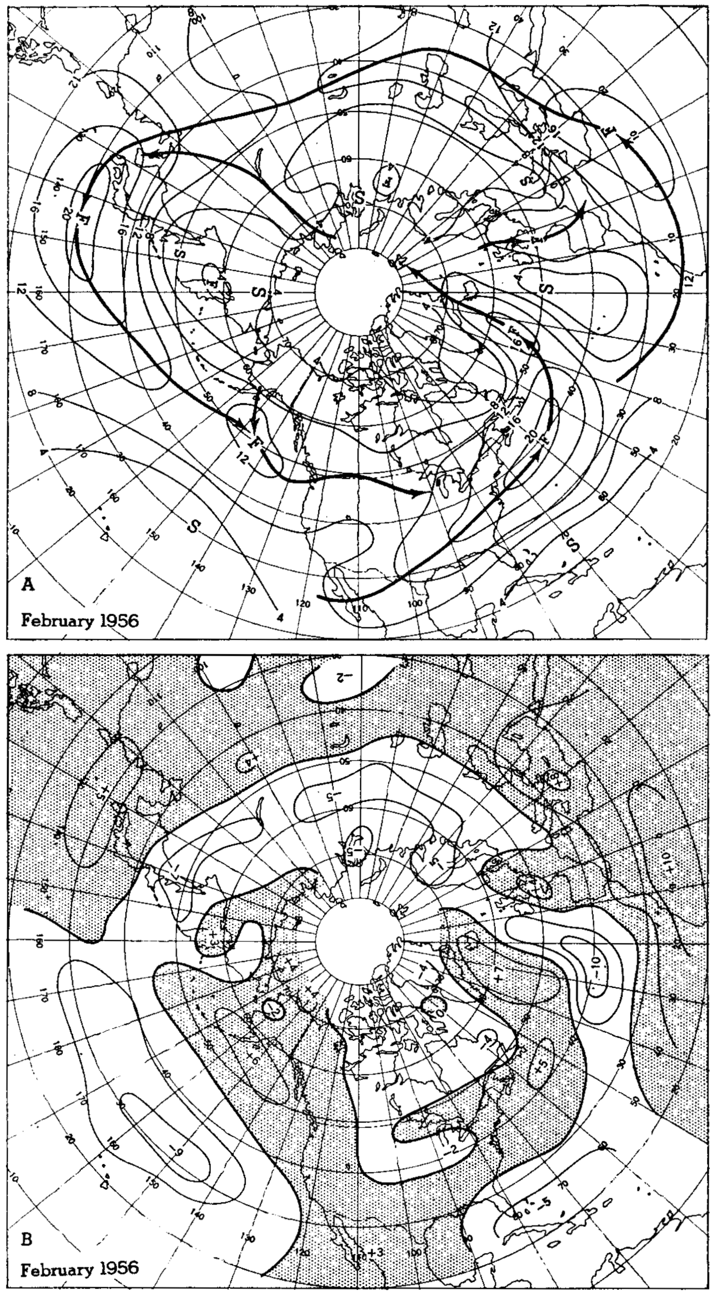

Figure 8.—(A) Mean 700-mb. isotachs and (B) departure from normal wind speed (both in meters per second) for February 1956. Solid arrows in (A) indicate position of the primary jet axes. "F" refers to centers of fast wind speeds; "S" to centers of slow winds. Areas of above normal wind speeds in (B) are shaded. Note the strong jet in the western Atlantic and its split into two branches by the North Atlantic block.

5. EUROPEAN WEATHER

Undoubtedly the most outstanding weather item of the month was the persistent and severe cold observed over the entire European Continent. The cold wave, described as the worst of the century in many areas, was closely related to the pronounced blocking in the North Atlantic and Eurasia, described in the previous section. This

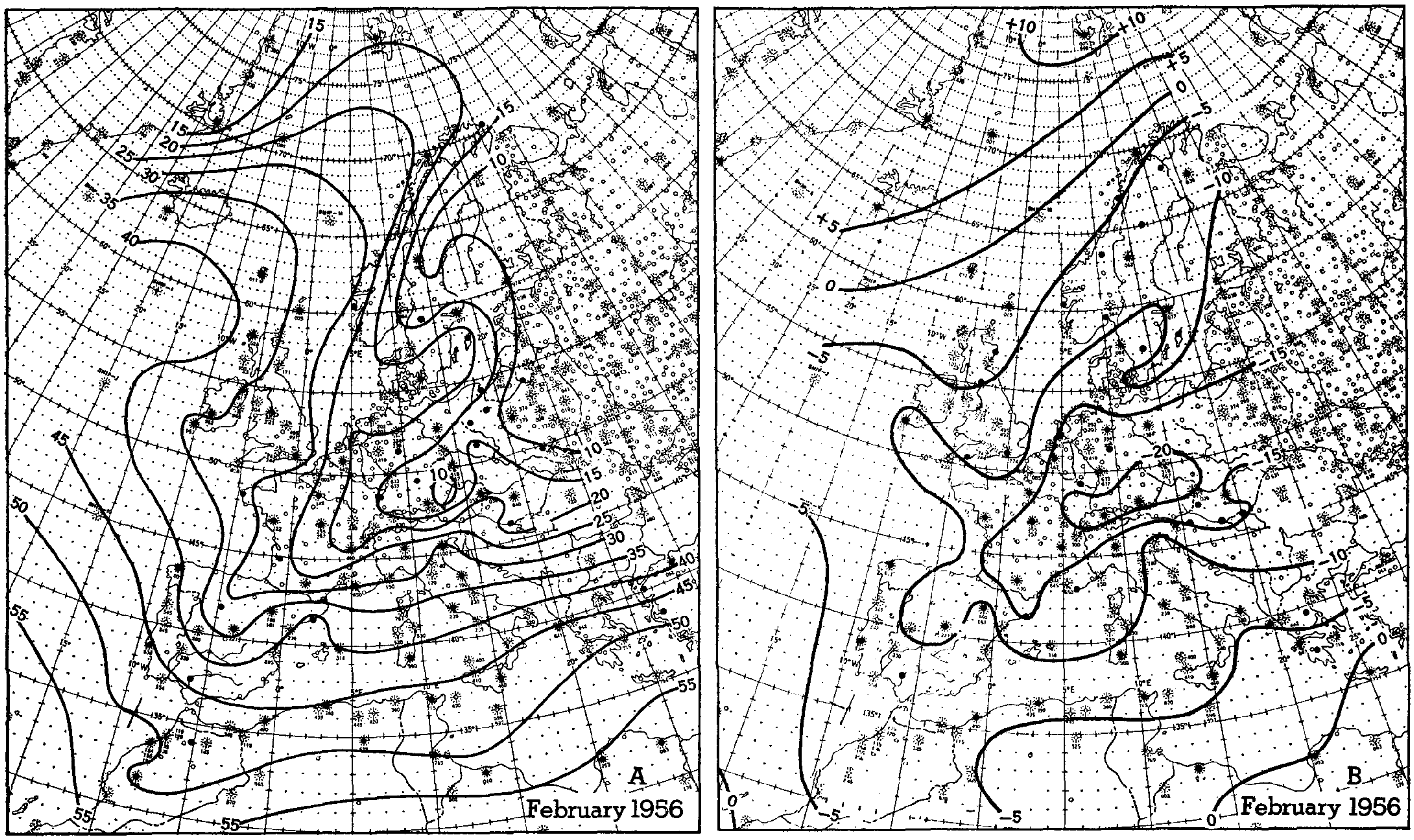

FIGURE 9.—(A) Monthly mean surface temperature and (B) departure from normal (both in °F.) for February 1956. Stations for which data were available are indicated by the solid dots.

extreme abnormality in the hemispheric circulation pattern brought increased continentality to all of Europe, particularly the northwestern and Mediterranean regions where the climate is normally of a milder maritime nature.

Figures 9 and 10 depict the analyzed climatological data for February for the eastern Atlantic, European, and extreme north African areas. These data are from the monthly "Climat" transmissions [11]. Normals used are based on a 30-year average (1901–30 when available) and are computed by the individual stations. They are considered as standard by the World Meteorological Organization. For the stations where normals based on this period or another 30-year period were not available, reference was made to Clayton [12] and Kendrew [13].

Figure 9B shows that temperatures averaged far below normal for the month over all of Europe. Greatest departures were observed in eastern France, southern Germany, Switzerland, and Austria where temperatures were as much as 20° F. below normal. Zurich, Switzerland, reported the greatest anomaly, a mean temperature of 24° F. below normal. In Paris, France a temperature of 9° F. was a record low for the second half of February, while Berlin, Germany had its coldest February 24 (−4° F.) in 125 years. Extreme temperatures of −40° F. were reported from northern Sweden and −45° F. near the Swiss-Italian frontier.

It is well known that easterly flow brings to Europe its coldest winter weather. Thus it is not surprising to find that stronger than normal easterly components prevailed at both sea level (fig. 6) and 700 mb. (fig. 1), across the entire Eurasian Continent. These east winds advected cold continental air masses from a region that is normally very cold during the winter—Russia and the Siberian Plain. In most of this area, temperatures in the layer from the surface to 700 mb. averaged below normal for the month (fig. 5). As examples of this intense cold, Verkhoyansk, in eastern Siberia, recorded one of the world's lowest temperatures (possibly a record) when a minimum of 102° F. below zero was recorded late in January 1956; while Moscow, Russia reported a temperature of −49° F. on January 31 [14]. Figure 5 shows that the center of this anomalously cold air was located in France, where a thickness anomaly of −400 ft. corresponded to a mean virtual temperature of 24° F. below normal.

To the west of the Atlantic block strong southerly flow at middle and lower levels (figs. 1, 6, 8) advected warm maritime air northward, resulting in a pronounced distortion of the mean isotherms (fig. 9). At Spitzbergen the temperature averaged 12° F. above normal for the month. The greatest temperature anomaly was associated with the Eurasian block, where a thickness

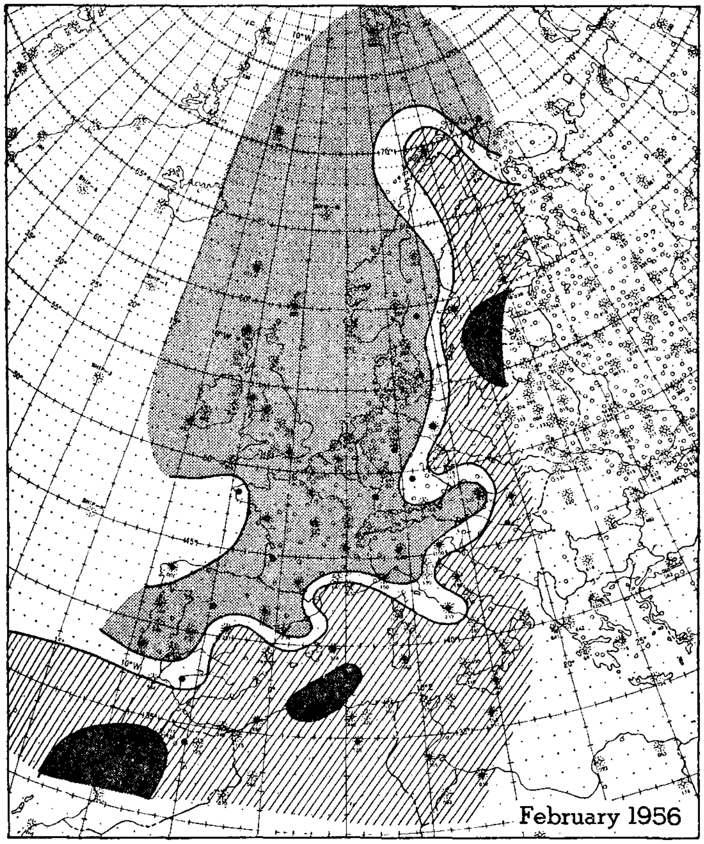

Figure 10.—Precipitation anomaly for February 1956. Data used in this analysis were the quintiles of the frequency distribution in which the monthly precipitation totals fell. To simplify the analysis quintiles 1 and 2 were combined into a single below normal class indicated by light shading, while quintiles 4 and 5 were combined into a single above normal class shown by the hatched areas. Unshaded portions are near normal (quintile 3) and darker shaded areas indicate a 30-year record. Stations for which data were available are indicated by the solid dots.

anomaly of +380 ft. in the polar regions corresponds to a mean virtual temperature of 23° F. above normal (fig. 5).

Less than normal precipitation fell in Great Britain and western Europe (fig. 10). This relatively dry weather was related to the prevalence of continental air masses in northeasterly flow, surface and aloft; lack of an adequate moisture source; and a deficiency of cyclonic activity. Greater than normal amounts of precipitation fell in eastern Europe and in regions bordering the Mediterranean Sea, with a few areas reporting the greatest amount for the 30-year period upon which their normal is based. This precipitation, much of it in the form of snow, was associated with the mean trough extending from eastern Europe to northwestern Africa (fig. 1), and with migratory cyclones following the primary storm track through the Mediterranean (fig. 6A). Somewhat weaker storms moving along the track from the North Sea southward produced little precipitation until they deepened over the warm waters of the Mediterranean. Snow covered the French Riviera for the first time in 15 years when a fall of 16 inches occurred, the heaviest in memory. Heavy, near record snows also fell in Portugal, northern Spain, and Italy. It is of interest to point out that the observed temperature and precipitation patterns are very similar to the composite patterns obtained by Rex [15] for a winter block.

A rapid reversal of climatic regimes occurred toward the end of the month as the prevailing easterly circulation gave way to strong westerlies, thus bringing warm, moist Atlantic air masses into the Continent. Heights at 700 mb. fell as much as 1,700 ft. from February 15–19 to February 25–29 near Novaya Zemlya as the block weakened and sank to lower latitudes. Cyclonic activity increased and followed a more normal path in the northeastern Atlantic, and, at month's end, an intense storm with central pressure near 965 mb. was centered on the Scandinavian coast.

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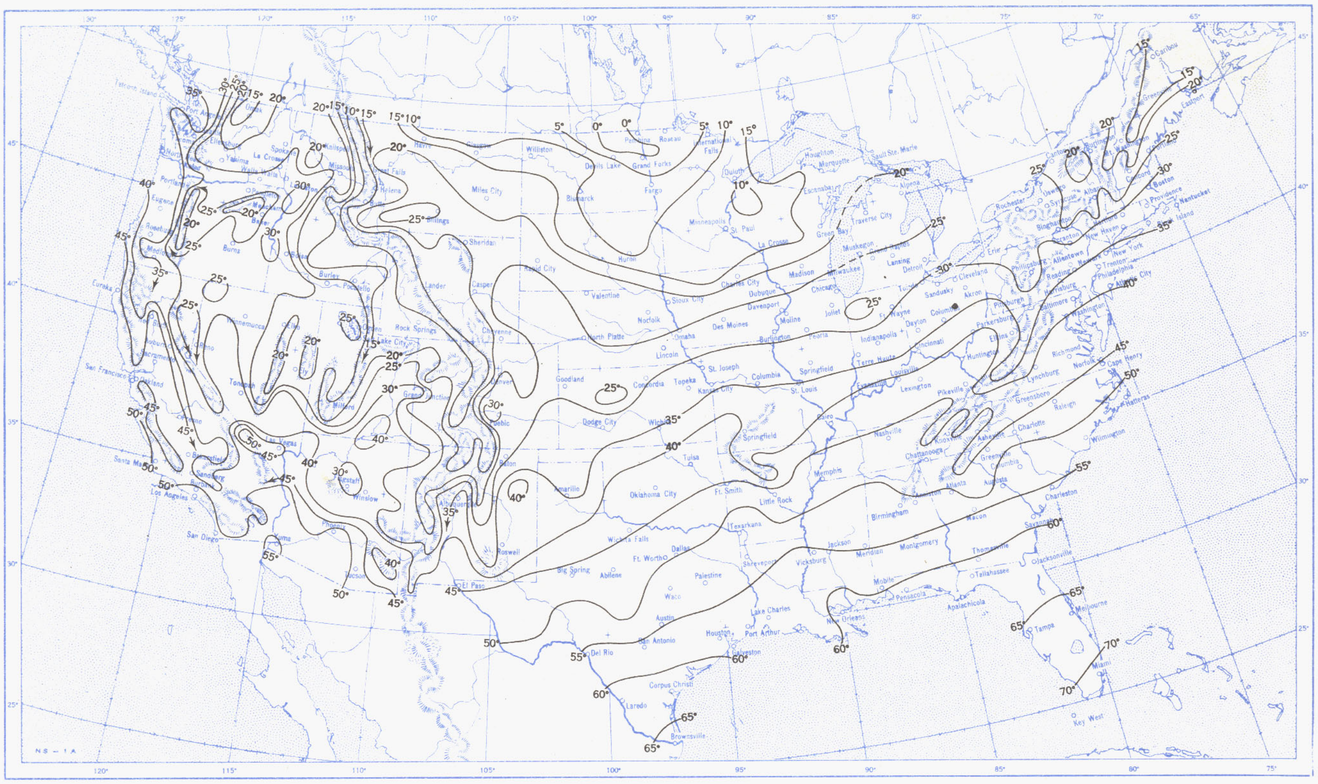
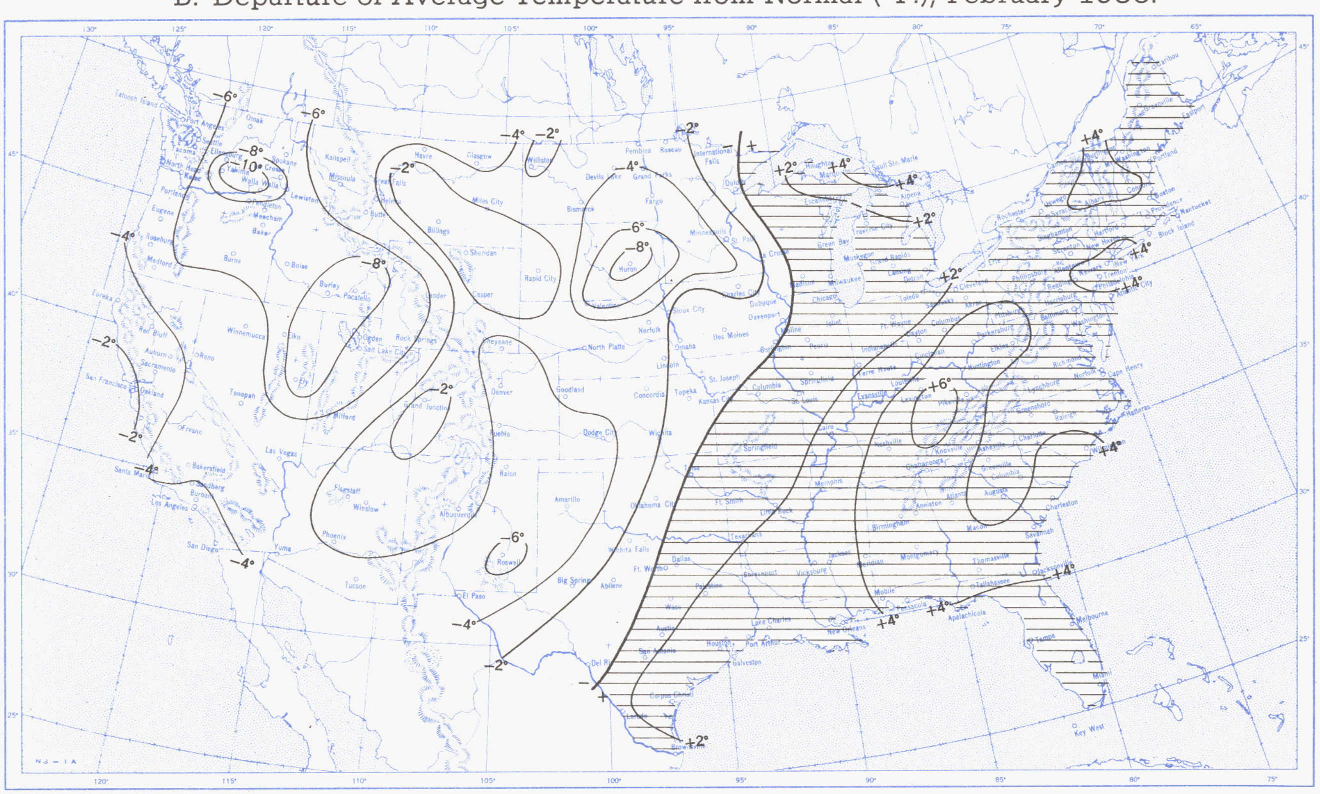
Chart I. A. Average Temperature (°F.) at Surface, February 1956.

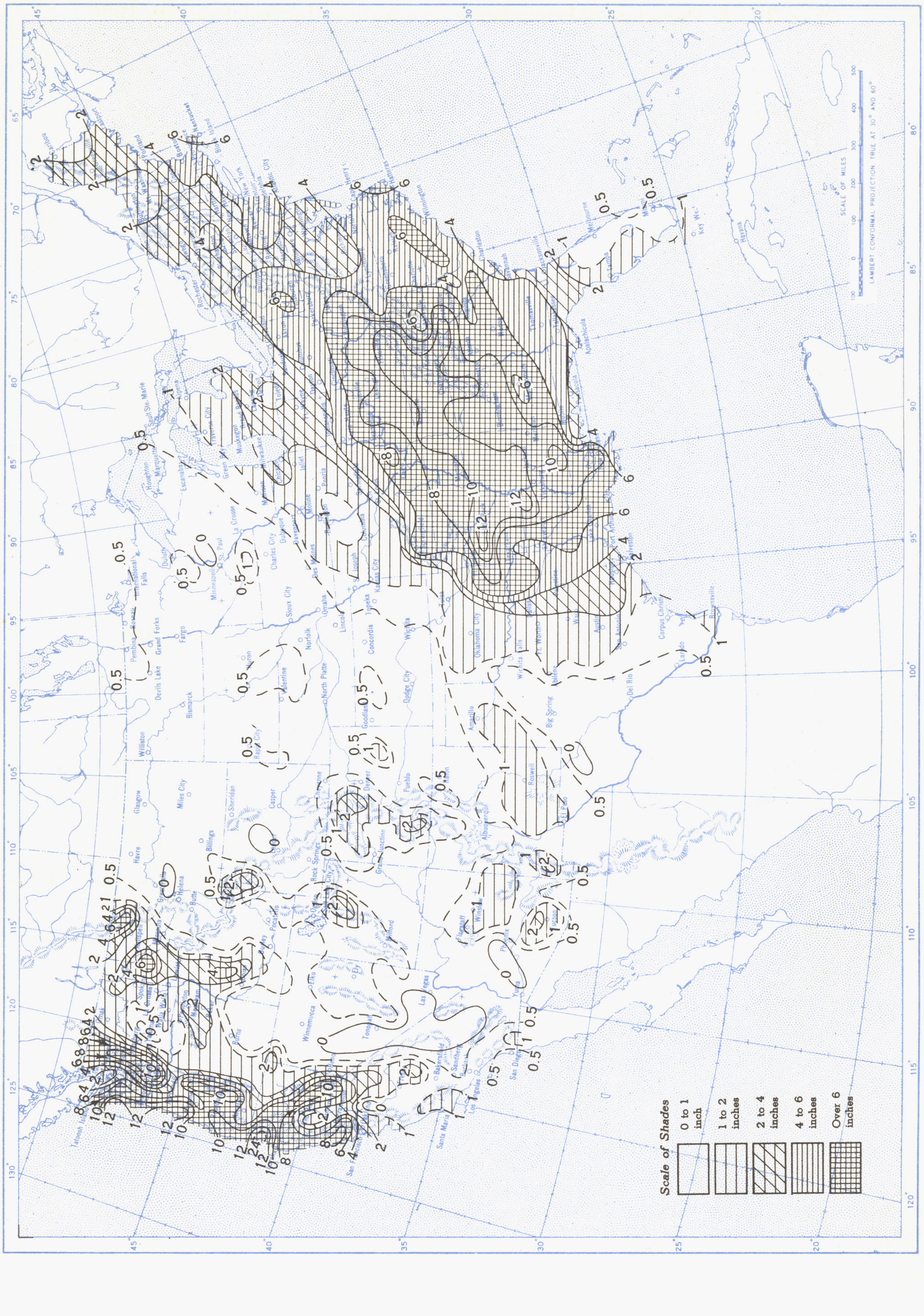


B. Departure of Average Temperature from Normal (°F.), February 1956.



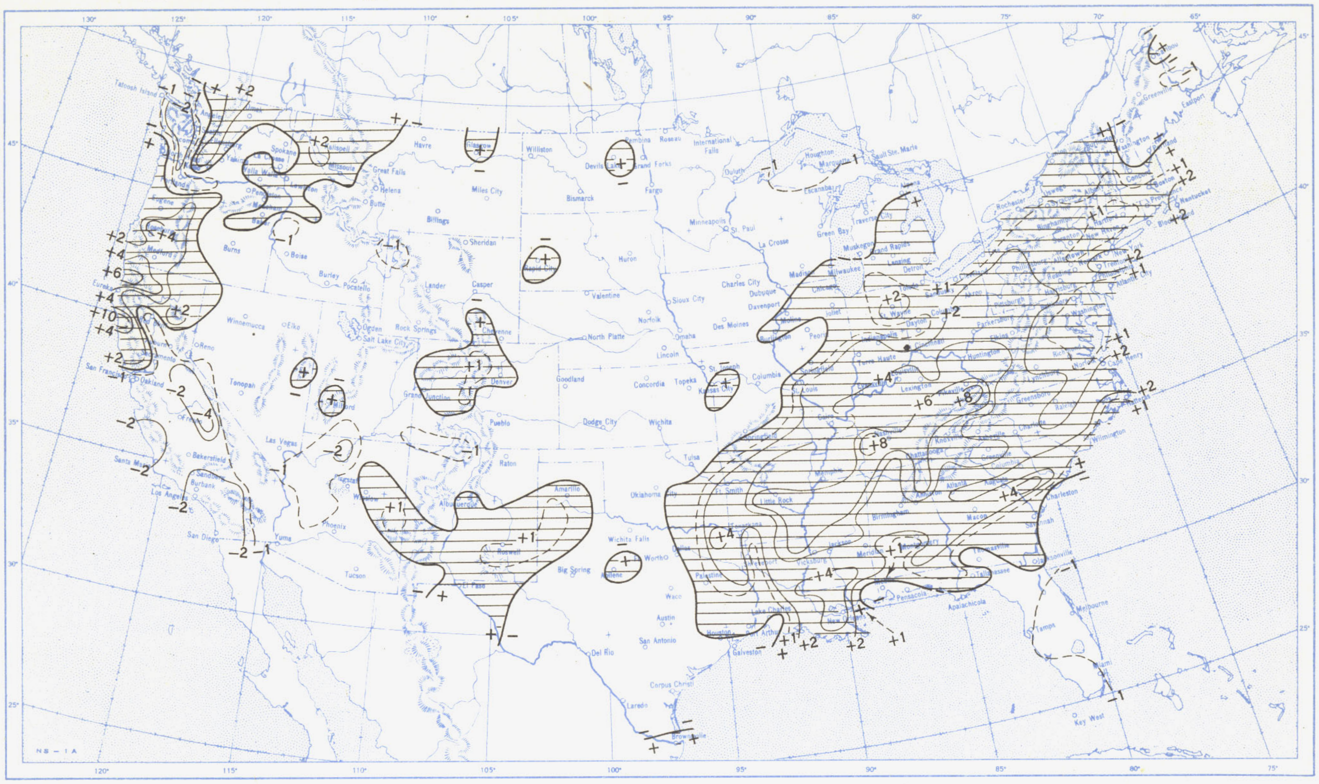
A. Based on reports from 800 Weather Bureau and cooperative stations. The monthly average is half the sum of the monthly average maximum and monthly average minimum, which are the average of the daily maxima and daily minima, respectively.
B. Normal average monthly temperatures are computed for Weather Bureau stations having at least 10 years of record.

Chart II. Total Precipitation (Inches), February 1956.

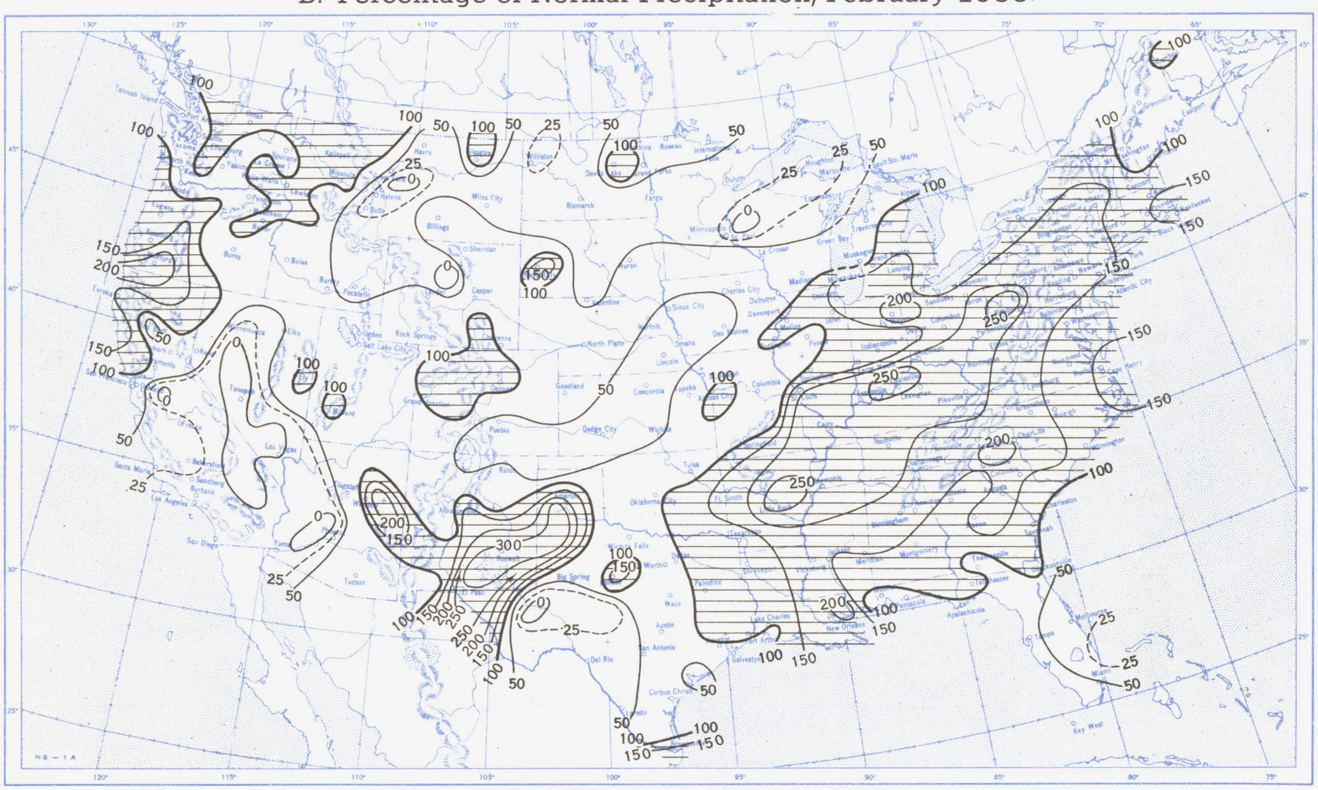


Based on daily precipitation records at 800 Weather Bureau and cooperative stations.

Chart III. A. Departure of Precipitation from Normal (Inches), February 1956.

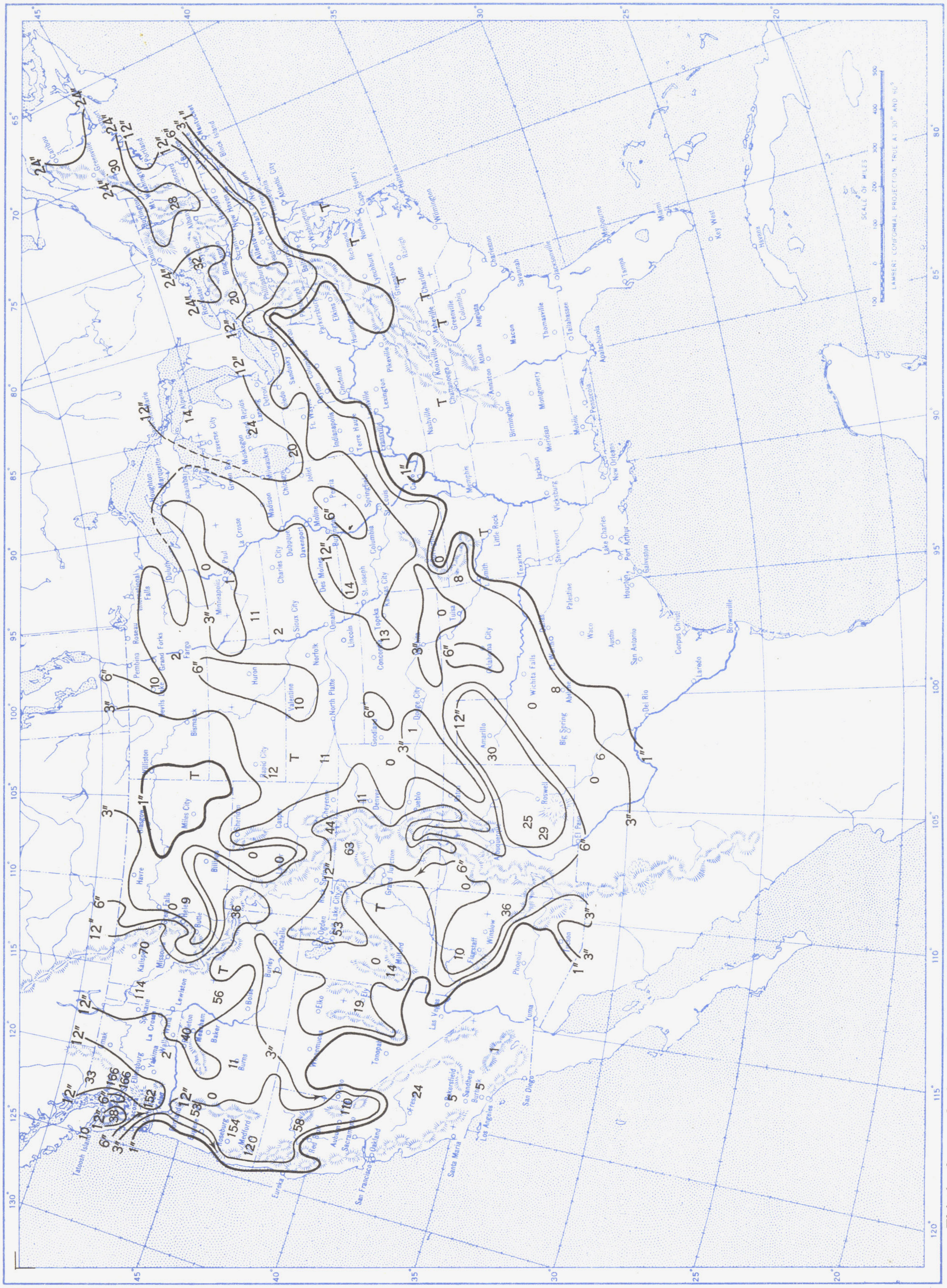


B. Percentage of Normal Precipitation, February 1956.



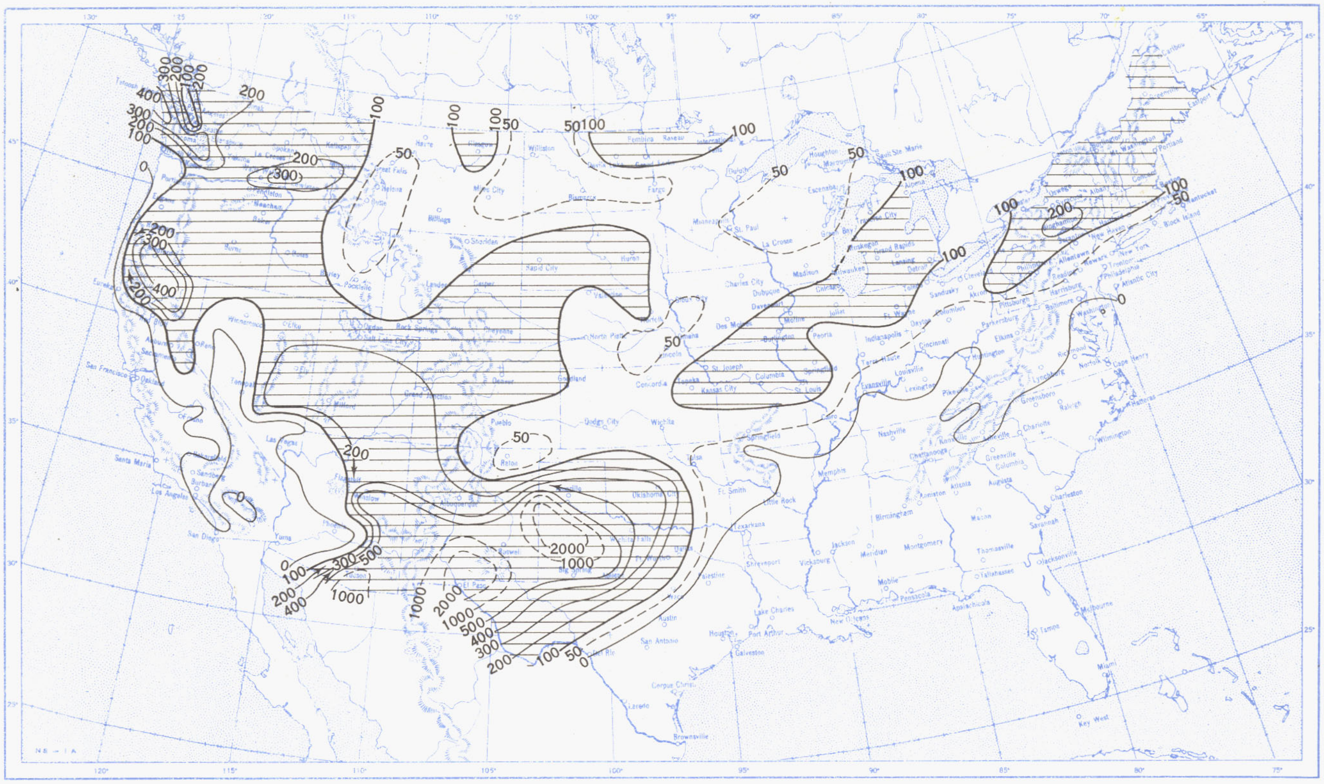
Normal monthly precipitation amounts are computed for stations having at least 10 years of record.

Chart IV. Total Snowfall (Inches), February 1956.

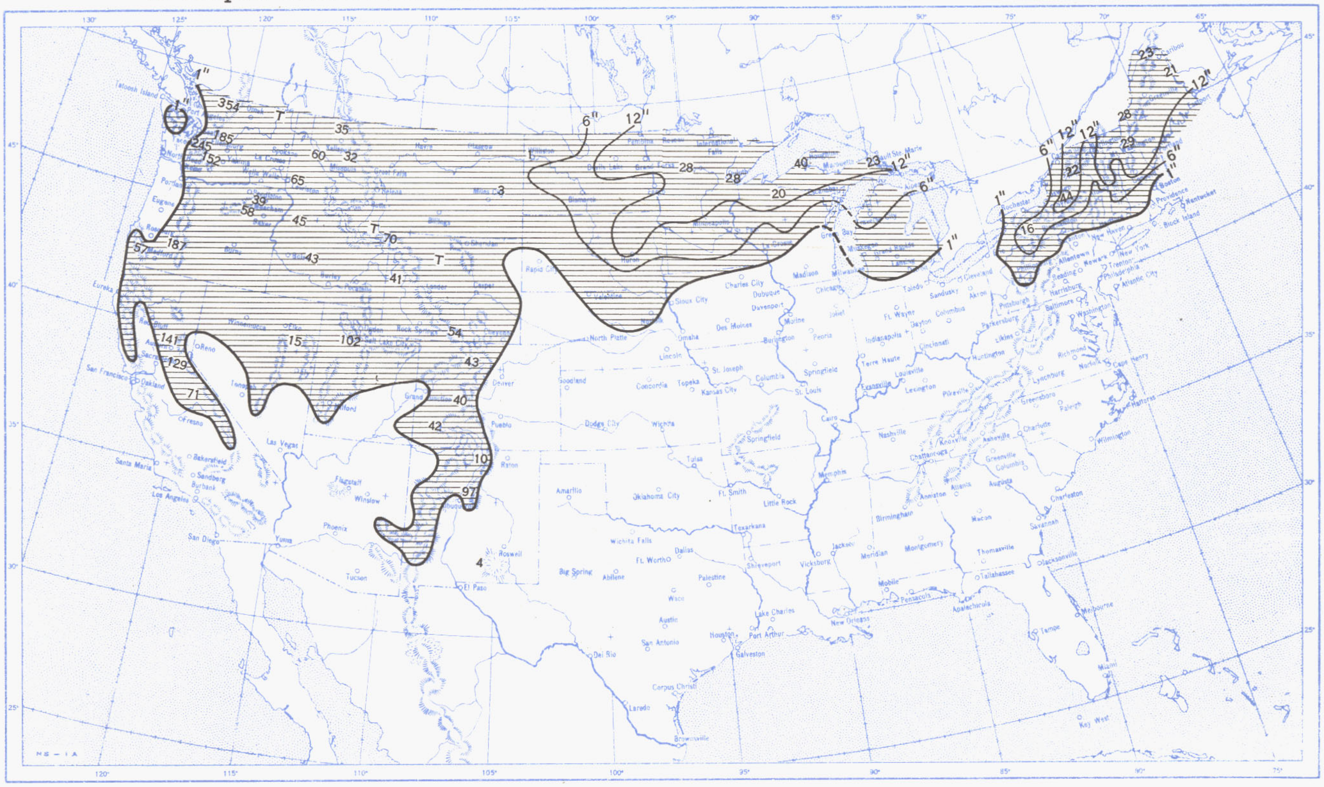


This is the total of unmelted snowfall recorded during the month at Weather Bureau and cooperative stations. This chart and Chart V are published only for the months of November through April although of course there is some snow at higher elevations, particularly in the far West, earlier and later in the year.

Chart V. A. Percentage of Normal Snowfall, February 1956.

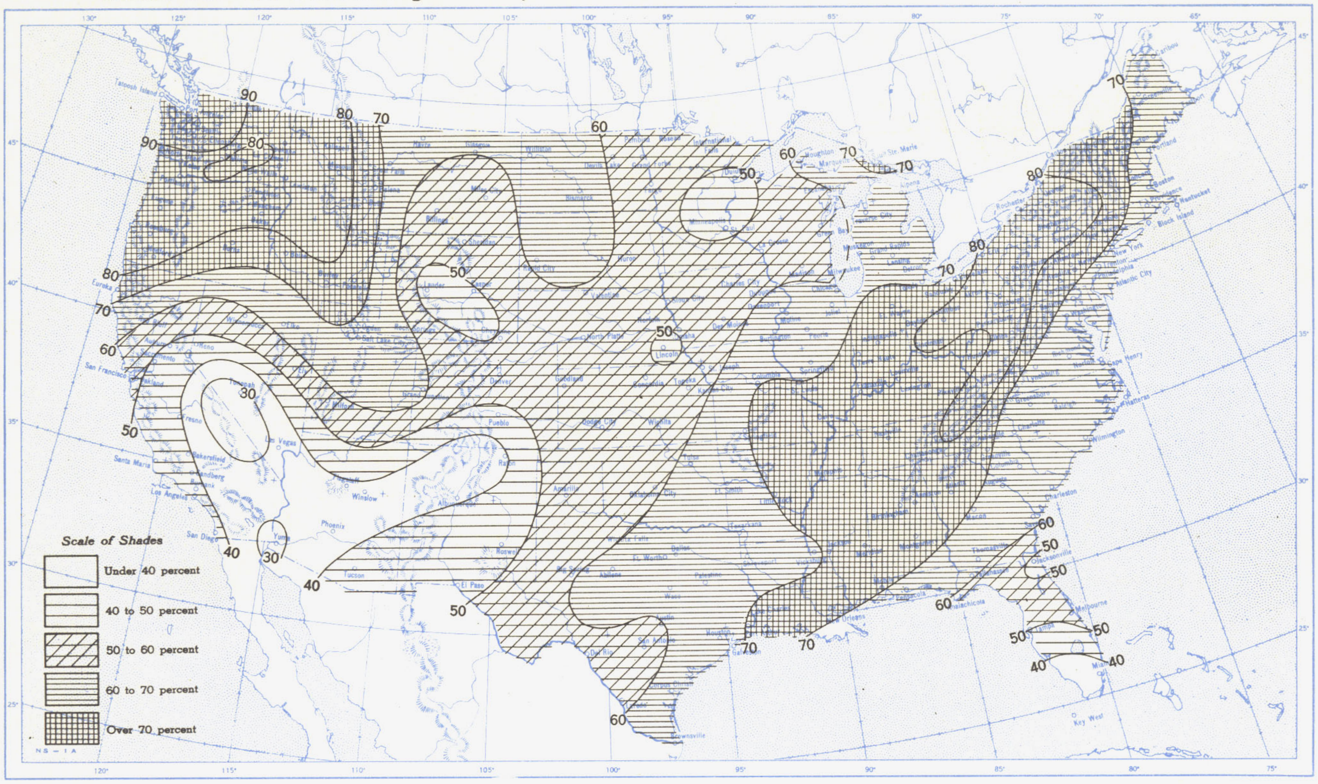


B. Depth of Snow on Ground (Inches). 7:30 a. m. E. S. T., February 27, 1956.

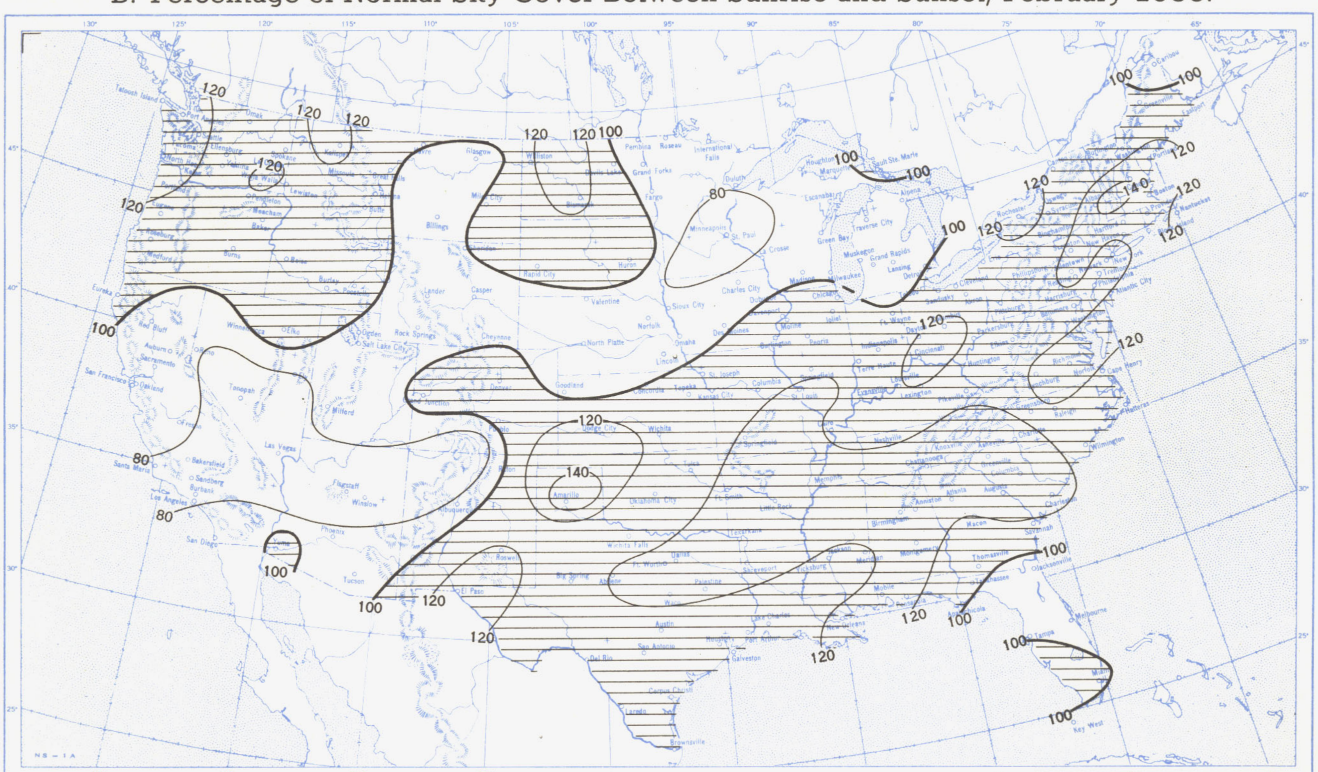


A. Amount of normal monthly snowfall is computed for Weather Bureau stations having at least 10 years of record.
B. Shows depth currently on ground at 7:30 a. m. E. S. T., of the Tuesday nearest the end of the month. It is based on reports from Weather Bureau and cooperative stations. Dashed line shows greatest southern extent of snowcover during month.

Chart VI. A. Percentage of Sky Cover Between Sunrise and Sunset, February 1956.

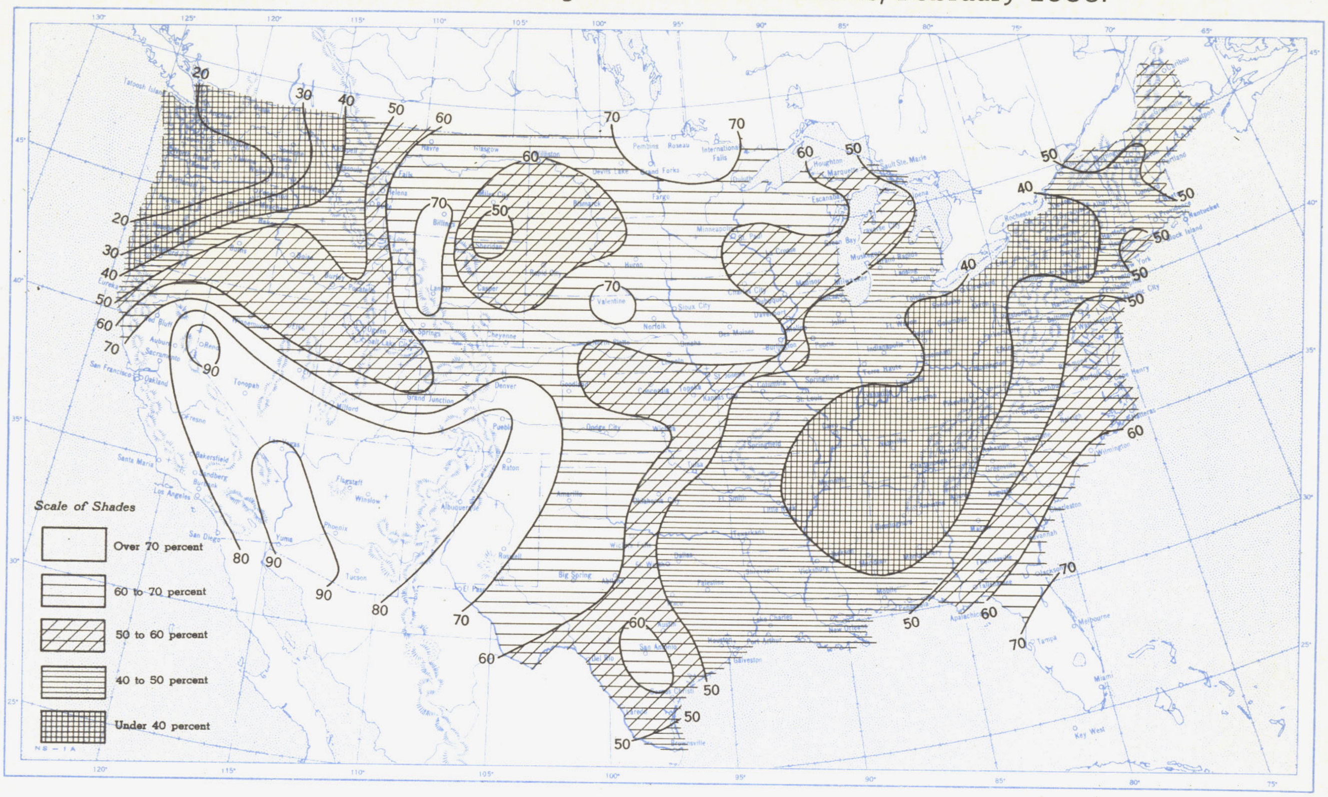


B. Percentage of Normal Sky Cover Between Sunrise and Sunset, February 1956.

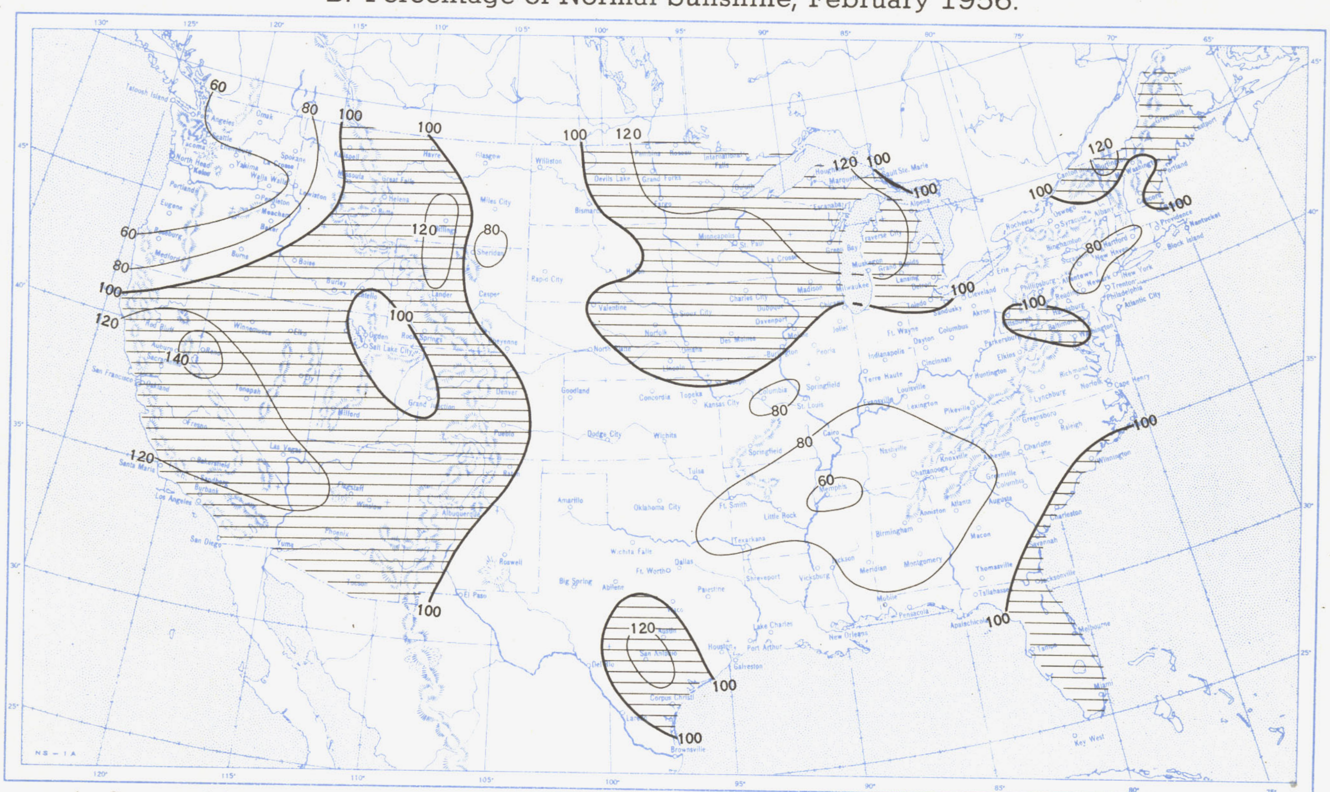


A. In addition to cloudiness, sky cover includes obscuration of the sky by fog, smoke, snow, etc. Chart based on visual observations made hourly at Weather Bureau stations and averaged over the month. B. Computations of normal amount of sky cover are made for stations having at least 10 years of record.

Chart VII. A. Percentage of Possible Sunshine, February 1956.



B. Percentage of Normal Sunshine, February 1956.



A. Computed from total number of hours of observed sunshine in relation to total number of possible hours of sunshine during month. B. Normals are computed for stations having at least 10 years of record.

Chart VIII. Average Daily Values of Solar Radiation, Direct + Diffuse, February 1956. Inset: Percentage of Mean Daily Solar Radiation, February 1956. (Mean based on period 1951-55.)

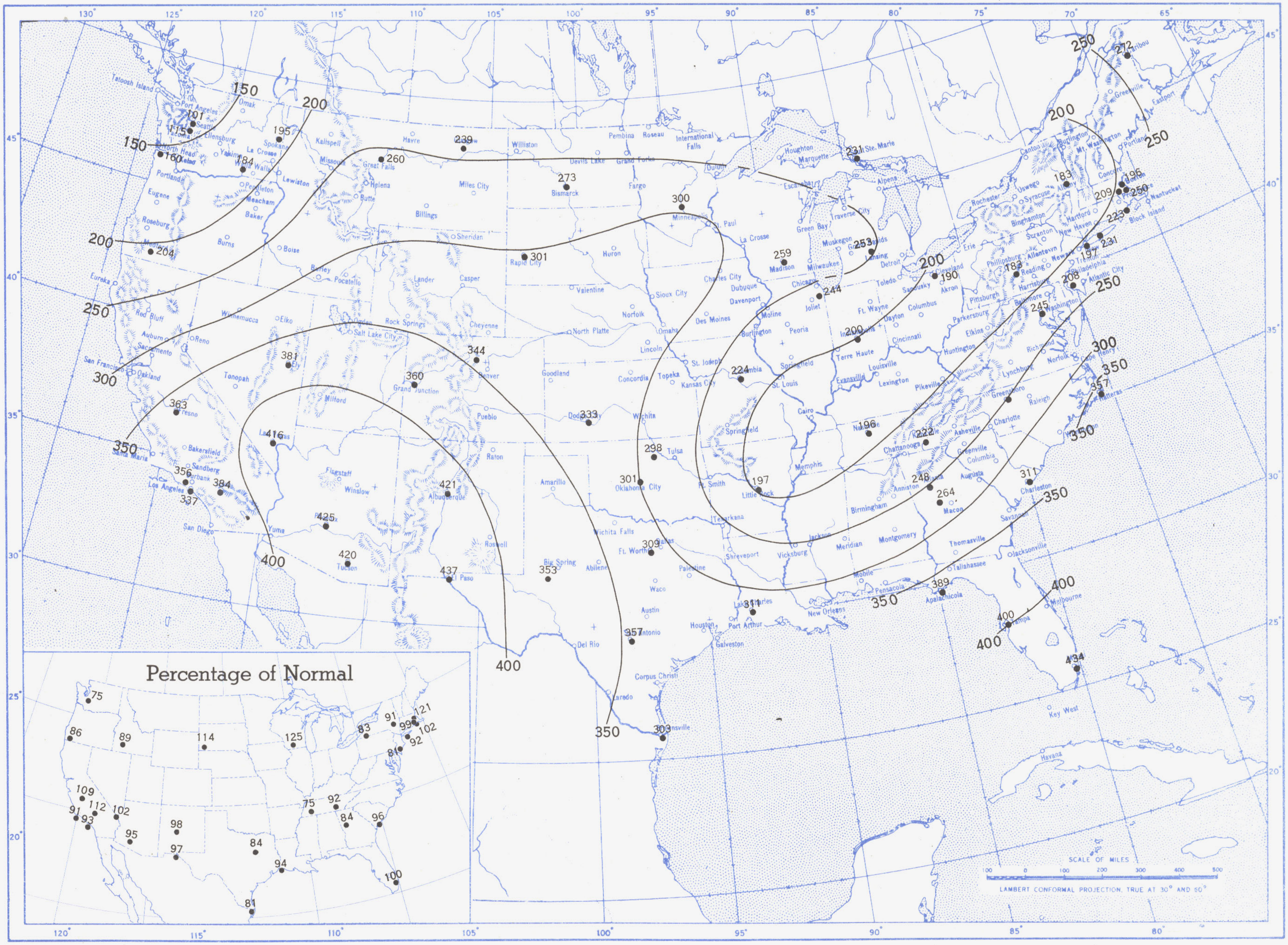
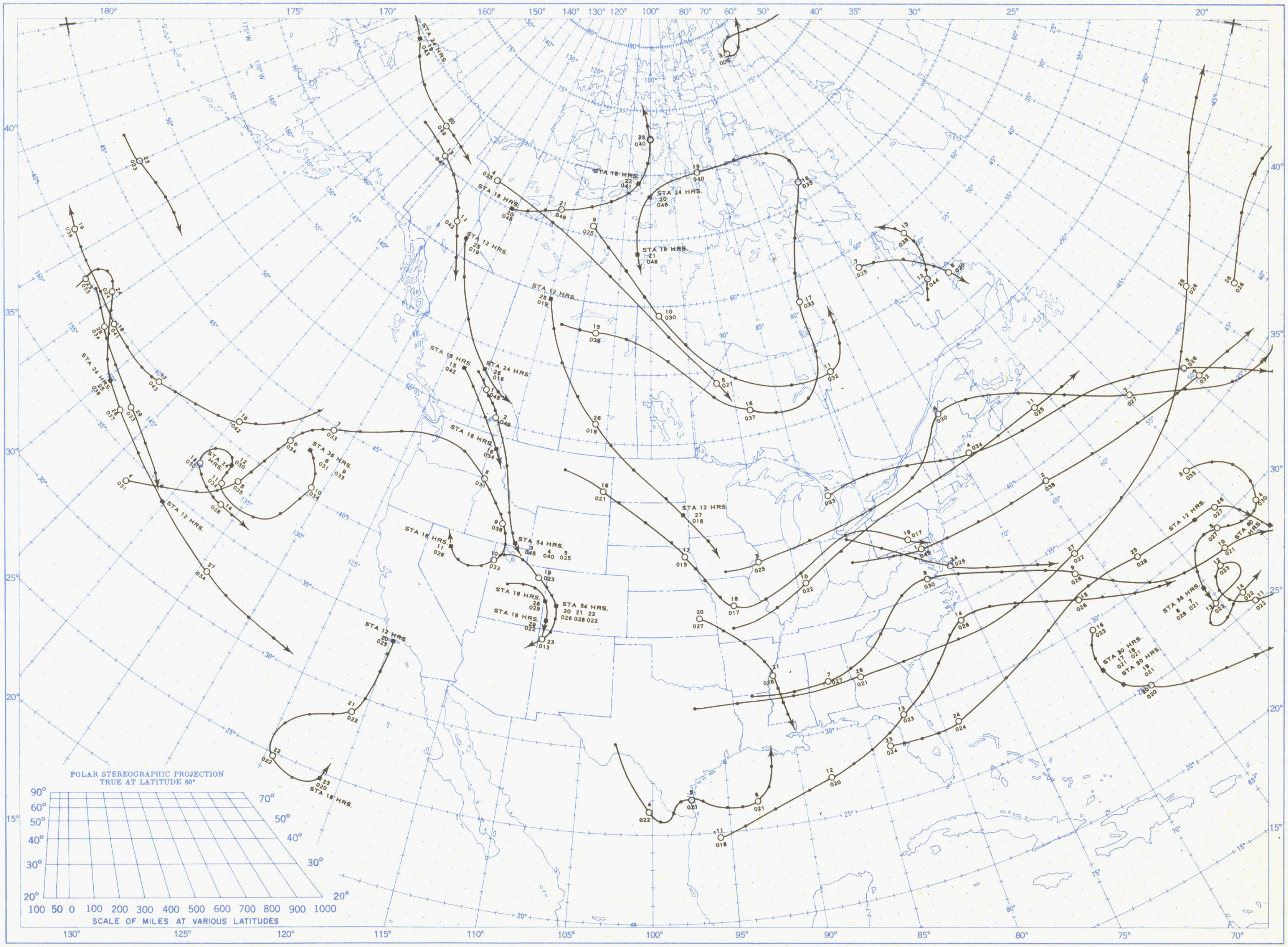


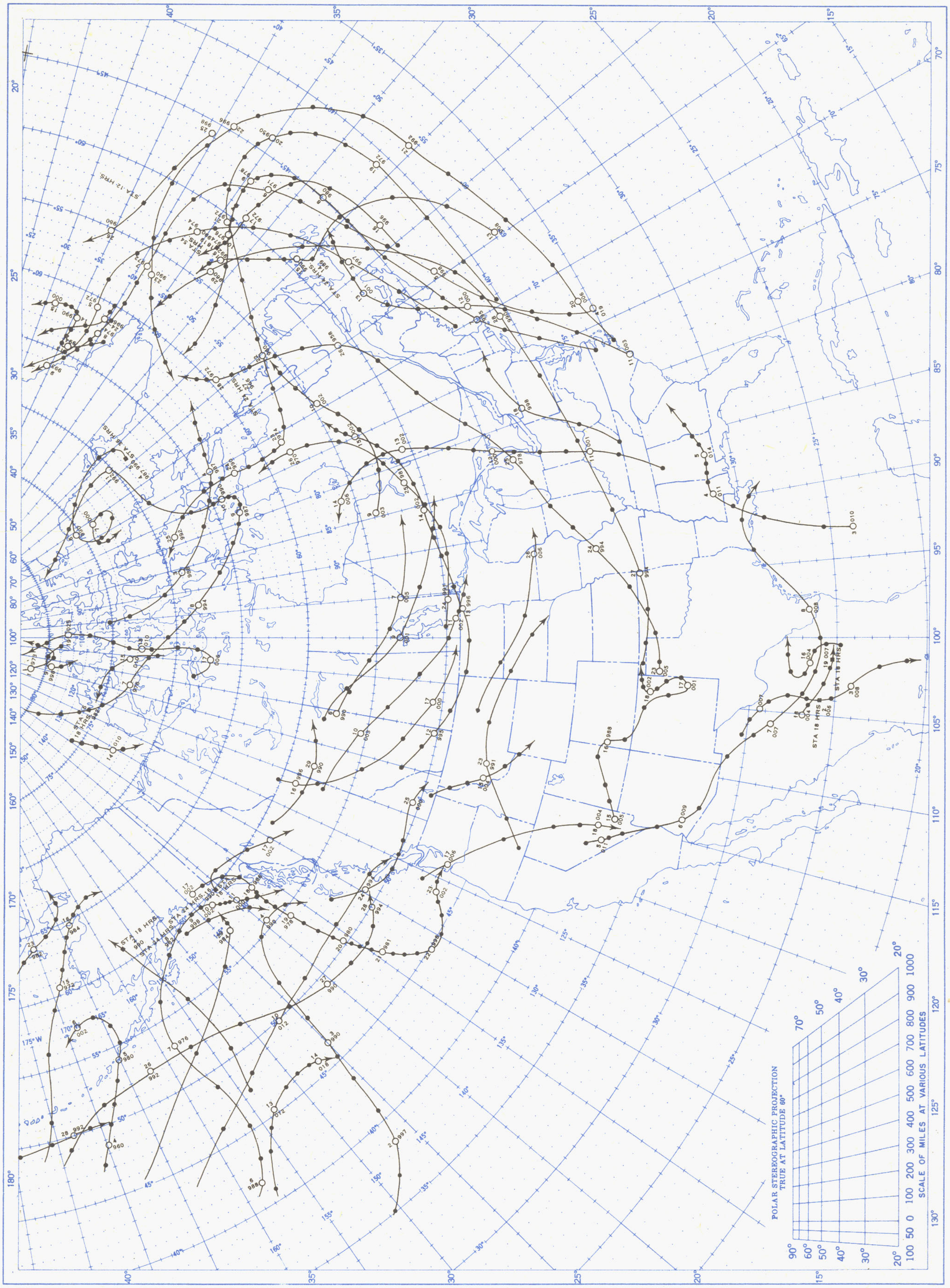
Chart shows mean daily solar radiation, direct + diffuse, received on a horizontal surface in langleys (1 langley = 1 gm. cal. cm.$^{-2}$). Basic data for isolines are shown on chart. Further estimates are obtained from supplementary data for which limits of accuracy are wider than for those data shown.

Chart IX. Tracks of Centers of Anticyclones at Sea Level, February 1956. (Corrected)



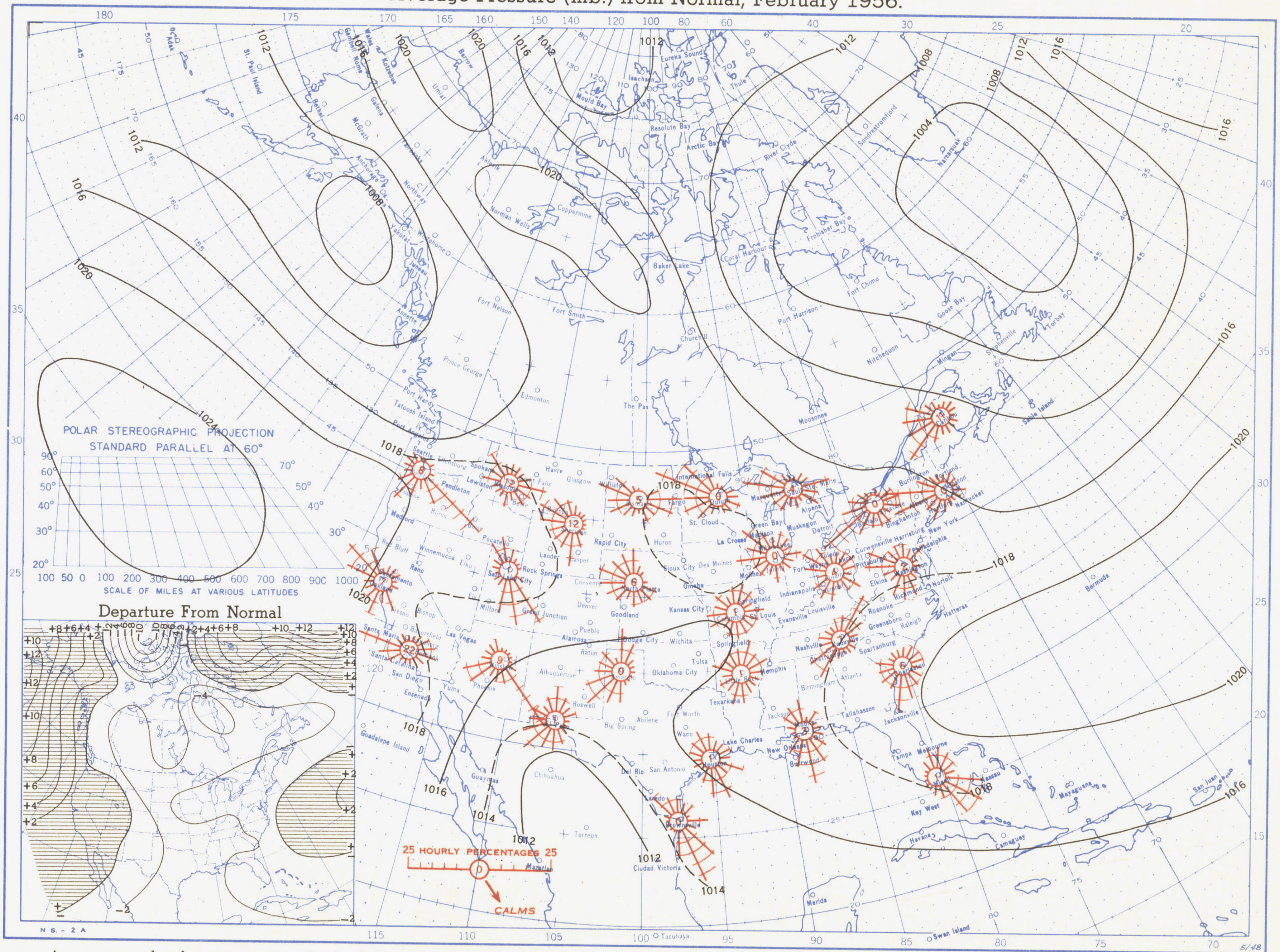
Circle indicates position of center at 7:30 a. m. E. S. T. Figure above circle indicates date, figure below, pressure to nearest millibar. Dots indicate intervening 6-hourly positions. Squares indicate position of stationary center for period shown. Dashed line in track indicates reformation at new position. Only those centers which could be identified for 24 hours or more are included.

Chart X. Tracks of Centers of Cyclones at Sea Level, February 1956. (Corrected)



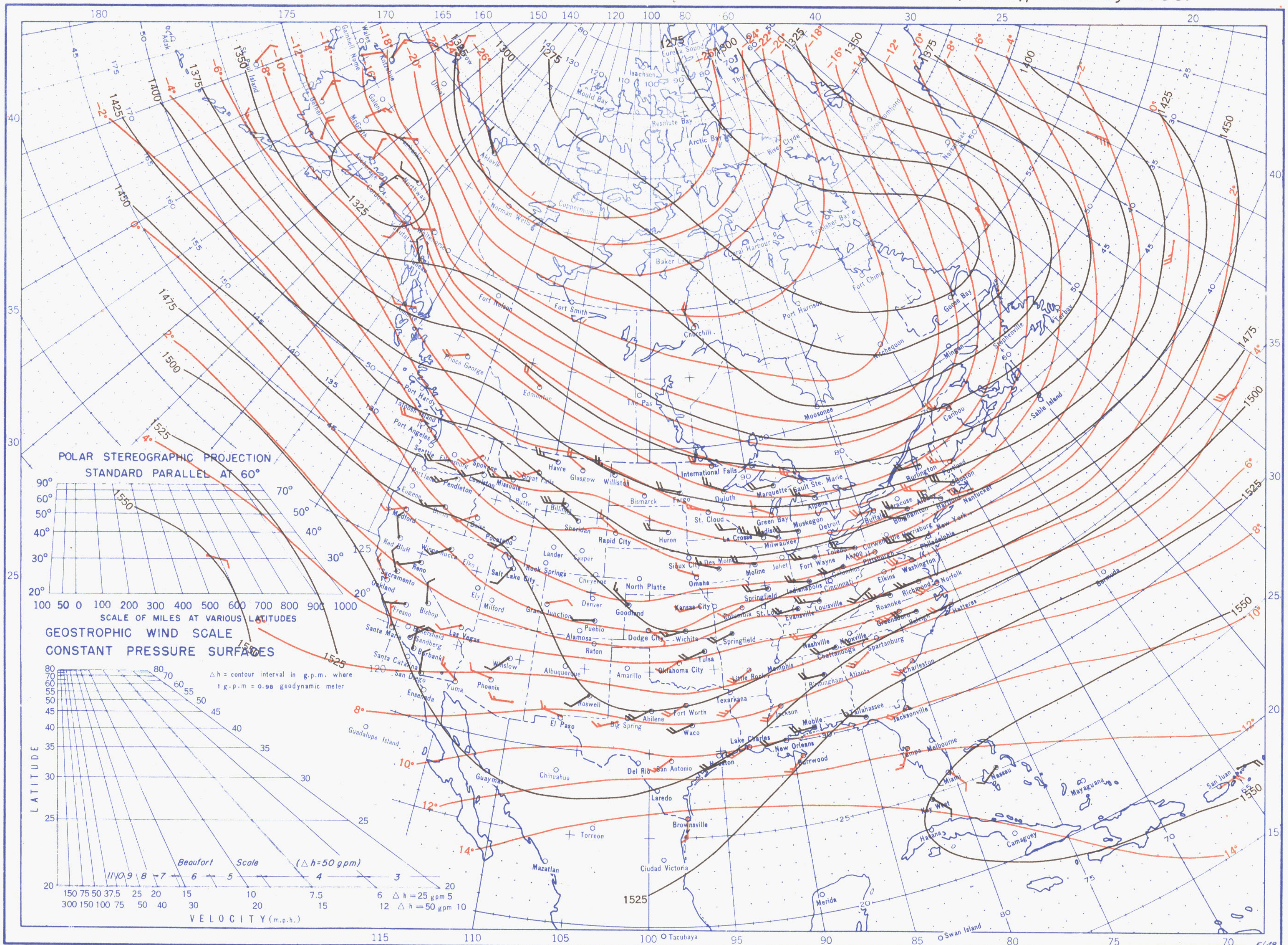
Circle indicates position of center at 7:30 a.m. E. S. T. See Chart IX for explanation of symbols.

Chart XI. Average Sea Level Pressure (mb.) and Surface Windroses, February 1956. Inset: Departure of Average Pressure (mb.) from Normal, February 1956.



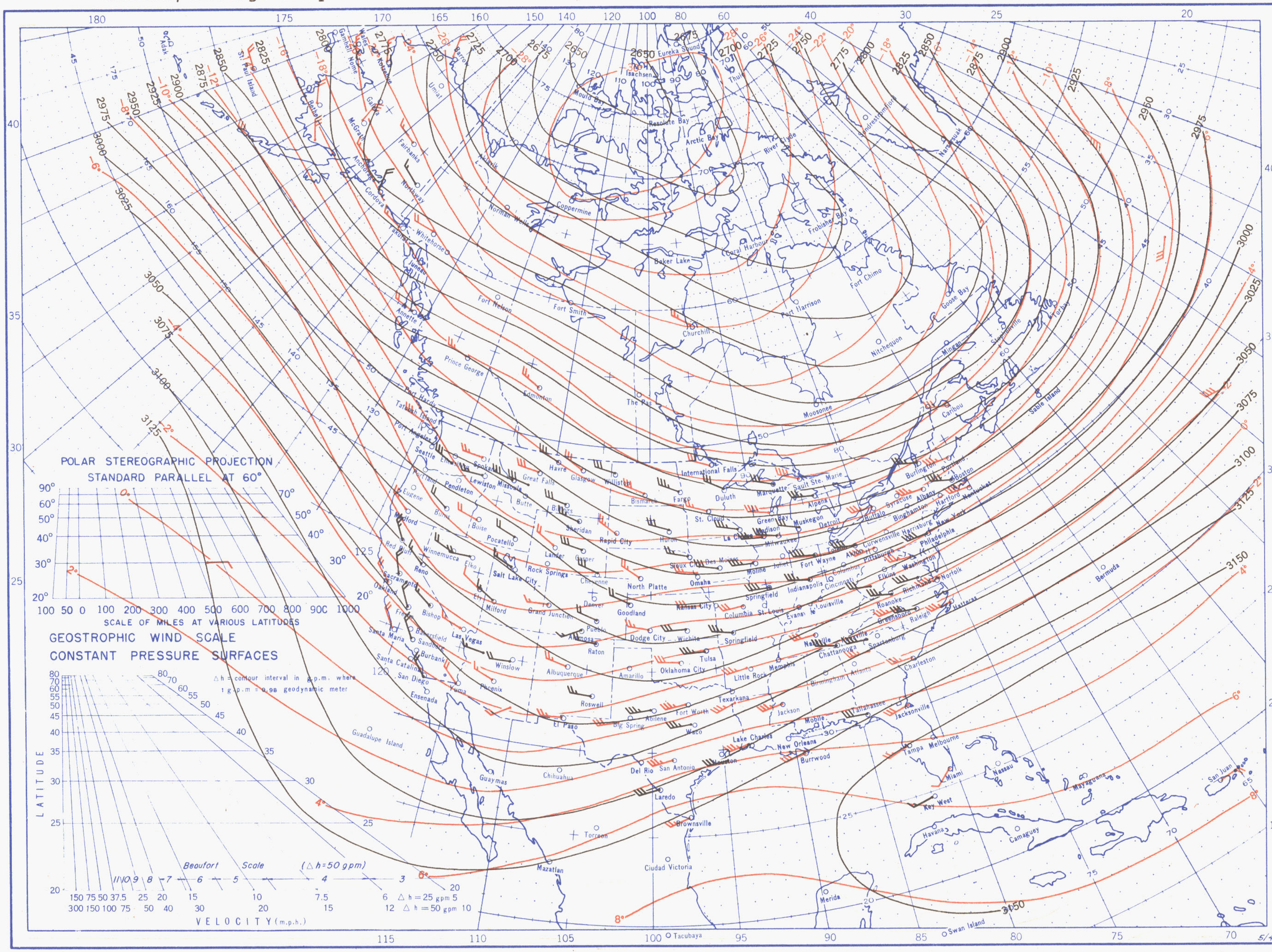
Average sea level pressures are obtained from the averages of the 7:30 a.m. and 7:30 p.m. E.S.T. readings. Windroses show percentage of time wind blew from 16 compass points or was calm during the month. Pressure normals are computed for stations having at least 10 years of record and for 10° intersections in a diamond grid based on readings from the Historical Weather Maps (1899-1939) for the 20 years of most complete data coverage prior to 1940.

Chart XII. Average Dynamic Height in Geopotential Meters (1 g.p.m. = 0.98 dynamic meters) of the 850-mb. Pressure Surface, Average Temperature in °C. at 850 mb., and Resultant Winds at 1500 Meters (m.s.l.), February 1956.



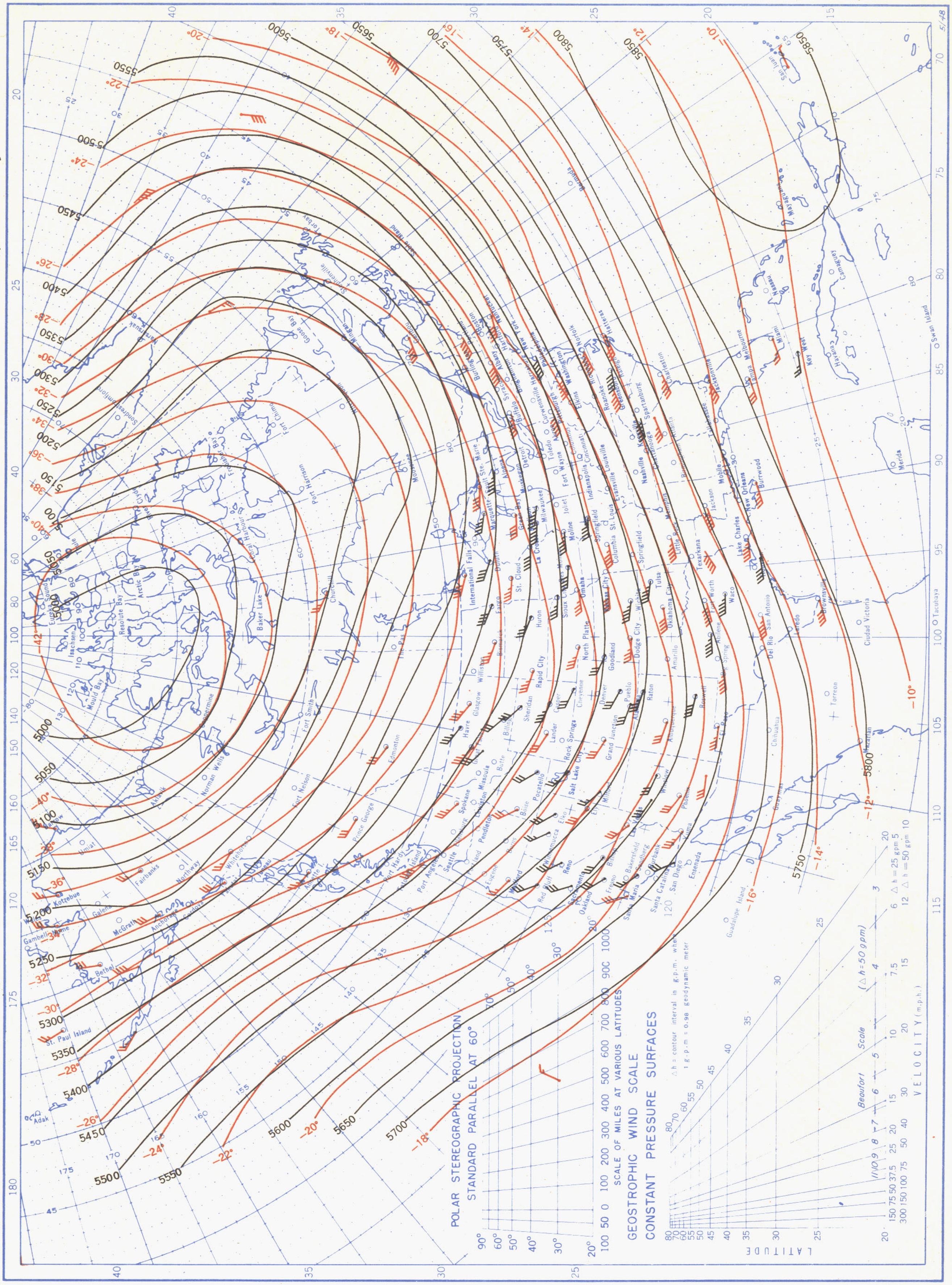
Contour lines and isotherms based on radiosonde observations at 0300 G. M. T. Winds shown in black are based on pilot balloon observations at 2100 G. M. T.; those shown in red are based on rawins taken at 0300 G. M. T. Wind barbs indicate wind speed on the Beaufort scale.

Chart XIII. Average Dynamic Height in Geopotential Meters (1 g.p.m.. = 0.98 dynamic meters) of the 700-mb. Pressure Surface, Average Temperature in °C. at 700 mb., and Resultant Winds at 3000 Meters (m.s.l.), February 1956.



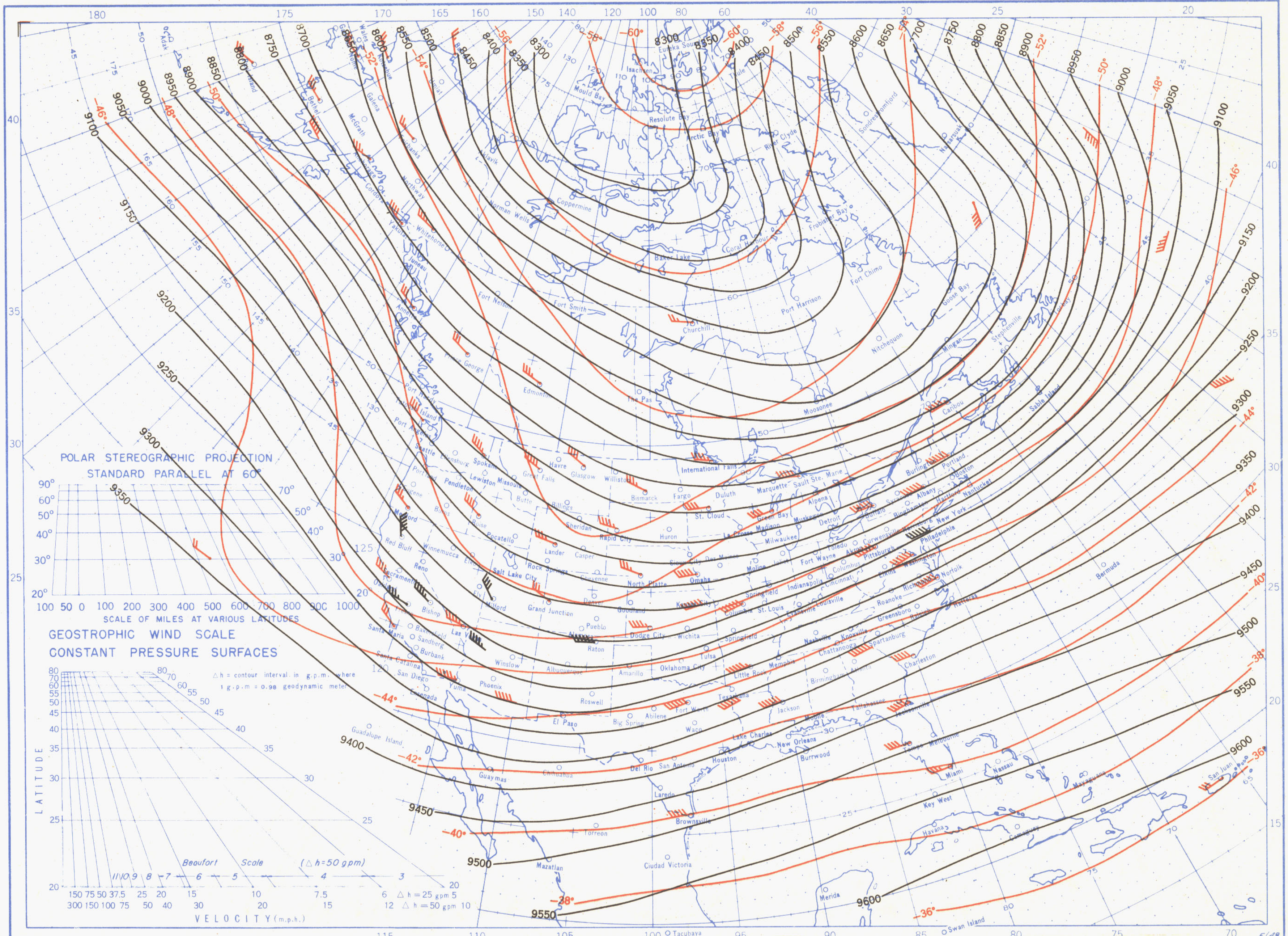
Contour lines and isotherms based on radiosonde observations at 0300 G. M. T. Winds shown in black are based on pilot balloon observations at 2100 G. M. T.; those shown in red are based on rawins taken at 0300 G. M. T. Wind barbs indicate wind speed on the Beaufort scale.

Chart XIV. Average Dynamic Height in Geopotential Meters (1 g.p.m. = 0.98 dynamic meters) of the 500-mb. Pressure Surface, Average Temperature in °C. at 500 mb., and Resultant Winds at 5000 Meters (m.s.l.), February 1956.



Contour lines and isotherms based on radiosonde observations at 0300 G. M. T. Winds shown in black are based on pilot balloon observations at 2100 G. M. T.; those shown in red are based on rawins at 0300 G. M. T. Wind barbs indicate wind speed on the Beaufort scale.

Chart XV. Average Dynamic Height in Geopotential Meters (1 g.p.m. = 0.98 dynamic meters) of the 300-mb. Pressure Surface, Average Temperature in °C. at 300 mb., and Resultant Winds at 10,000 Meters (m.s.l.), February 1956.



Contour lines and isotherms based on radiosonde observations at 0300 G. M. T. Winds shown in black are based on pilot balloon observations at 2100 G. M. T.; those shown in red are based on rawins at 0300 G. M. T. Wind barbs indicate wind speed on the Beaufort scale.